Government
Publications

SESSIONAL PAPERS.

VOL. XXXII.—PART VI.

THIRD SESSION, NINTH LEGISLATURE

OF THE

PROVINCE OF ONTARIO.

SESSION 1900.

TORONTO:
PRINTED AND PUBLISHED BY L. K. CAMERON.
Printer to the Queen's Most Excellent Majesty.
1900.

WARWICK BRO'S & RUTTER, PRINTERS.

TORONTO.

LIBRARY
JUL 12 1966
UNIVERSITY OF TORONTO

1091179

LIST OF SESSIONAL PAPERS.

PRESENTED TO THE HOUSE DURING THE SESSION.

TITLE.	No.	REMARKS.
Accounts (*Dom. and the Provinces*), Awards	51	*Printed.*
" Financial Commission	47	"
" Report of Commission	4	"
" Public	1	"
Agricultural College, Report	14	"
" and Experimental Union, Report	15	"
" and Horticultural Societies, Report	65	*Not printed.*
Amherstburg, Audit of Accounts	59	"
Asylums, Report	34	*Printed.*
Barron, Judge, O. in C.	64	*Not printed.*
Bee Keepers' Association, Report	20	*Printed.*
Binder Twine sold in 1899	72	*Not printed.*
Births, Marriages and Deaths, Report	9	*Printed.*
Blanche River Pulp Company	49	"
Blind Institute, Report	37	"
Bonuses and Exemptions, Municipal	69	*Not printed.*
Boys and Girls reprieved	71	"
Cheese and Butter Associations, Report	22	*Printed.*
Children Neglected, Report	39	"
Courts, moneys in	55	*Not printed*
Courts, Sittings of the	81	"
Crown Lands, Report	3	*Printed.*
Deaf and Dumb Institute, Report	38	*Printed.*
Division Courts, Report	29	"
Doyle, Judge, O. in C.	58	*Not printed.*
Education, Report	12	*Printed.*
Elections, Returns	42	"
Elgin West, Commission	46	"
Entomological Society, Report	19	"
Estimates	2	"
Factories, Report	8	*Printed.*
Factories, Employes in	77	*Not printed.*
Farmers' Institutes, Report	24	*Printed.*
Financial Commission, Report	4	"
Fruit Experiment Stations, Report	17	"
Fruit Growers' Association, Report	16	"
Fumigation Appliances, Report	44	"

Title.	No.	Remarks.
Game and Fish, Report	27	*Printed.*
Gaols, Prisons, etc., Report	35	"
Guarantee Policies	63	*Not printed.*
Health, Report	32	*Printed.*
Hoskin, John, salary	75	*Not printed.*
Hospitals and Charities, Report	36	*Printed.*
Immigration, Report	28	*Printed.*
Imperial Institute, Canadian Section	74	*Not printed.*
Infants, Moneys of, in Court	53	"
Industries, Report	26	*Printed.*
Insurance, Report	10	"
Insurance Company's, Guarantee Policies	63	*Not printed.*
Judicature Act, Judges fees under	58, 61, 62, 64	*Not printed.*
Judicature, Court of, money in, or under control of	55	"
Legal Offices, Report	30	*Printed.*
Leeds and Grenville, claim of	82	*Not printed.*
Library, Report on	45	"
License Inspectors, names of, etc.	67	"
Liquor Licenses, Report	40	*Printed.*
Live Stock Associations, Report	23	"
Live Stock, Registrar of, Report	73	"
Loan Corporations, Report	11	"
McNiven, Donald, appointment of	54	*Not printed.*
Manufacturing Industries, Bonuses to	69	"
Mayor's Report	40	*Printed.*
Mines, Report	5	"
Mines Act, regulations	56	"
Moneys in the Courts	55	*Not printed.*
Morson, Judge, O. in C	61	"
Municipal Auditor, Report	41	*Printed.*
Municipal Bonuses and Exemptions	69	*Not printed.*
Nepigon Pulp Company	80	*Printed.*
North Augusta License	60	*Not printed.*
Ontario Power Company, agreement	79	*Not printed.*
Poultry Associations, Report	21	*Printed.*
Printing and Binding, Tenders	57	"
Prisons and Reformatories, Report	35	"
Provincial Municipal Auditor, Report	41	"
Public Accounts	1	"
" Commission	47	"
" Report of Commission	4	"
Public Works, Report	7	"

TITLE.	No.	REMARKS.
Pulp Company, Spanish River	50	*Printed.*
" Blanche River	49	"
" Nepigon River	80	"
Queen *vs.* Bole and Cahill	70	*Not printed*
Queen Victoria Niagara Falls Park, Report	6	*Printed.*
" " agreement with Ontario Power Company	79	*Not printed.*
Registry Offices, Report of Inspector	31	*Printed.*
Revenue received in 1899	76	*Not printed.*
Road-making, Report	25	*Printed.*
San José Scale, Report	43	*Printed.*
Secretary and Registrar, Report	33	"
Spanish River Pulp Company	50	"
Spraying, Report of Superintendent	18	"
Statutes, distribution, correspondence	78	*Not printed.*
" distribution	52	"
Tavern and Shop Licenses Act, Report	40	*Printed.*
Thedford License	84	*Not printed.*
Titles, Report of Master	68	"
Toronto University, Reports	13	*Printed.*
Upper Canada College, Report	83	*Printed.*
Warren, Frederick, appointment of	66	*Not printed*
West Elgin Commission	46	*Printed,*
Workmen's Compensation, Mayor's Report	40	"

LIST OF SESSIONAL PAPERS.

Arranged in Numerical Order with their titles at full length; the dates when Ordered and when presented to the Legislature; the name of the Member who moved the same, and whether Ordered to be Printed or not.

CONTENTS PART I.

No. 1.. Public Accounts of the Province for the year 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

No. 2.. Estimates (Vote of Credit) for the year 1900. Presented to the Legislature, 15th February, 1900. *Not Printed.* Estimates for the year 1900. Presented to the Legislature, 6th March, 1900. *Printed.* Estimates (Supplementary). Presented to the Legislature, 25th April, 1900. *Printed.*

No. 3.. Report of the Commissioner of Crown Lands for the year 1899. Presented to the Legislature, 29th March, 1900. *Printed.*

No. 4.. Report of the Royal Commission, on the Financial position of the Province. Presented to the Legislature, 6th March, 1900. *Printed.*

CONTENTS PART II.

No. 5.. Report of the Bureau of Mines for the year 1899. Presented to the Legislature, 25th April, 1900. *Printed.*

No. 6.. Report of the Commissioners for the Queen Victoria Niagara Falls Park for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 7. Report of the Commissioner of Public Works for the year 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 8.. Report of the Inspectors of Factories for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

No. 9.. Report upon the Registration of Births, Marriages and Deaths in the Province for the year 1899. Presented to the Legislature, 9th March, 1900. *Printed.*

CONTENTS PART III.

No. 10.. Report of the Inspector of Insurance and Registrar of Friendly Societies for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

CONTENTS PART IV.

No. 11.. Report of the Financial Statements made by Loan Corporations for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

CONTENTS PART V.

No. 12 . Report of the Minister of Education for the year 1899, with the Statistics of 189s. Presented to the Legislature, 8th March, 1900. *Printed.*

No. 13.. Reports of Auditor and Standing Committee on Finance for 1899-1900, of the University of Toronto. Presented to the Legislature, 10th April, 1900. *Printed.*

No. 14 . Report of the Ontario Agricultural College and Experimental Farm for the year 1899. Presented to the Legislature, 17th April, 1900. *Printed.*

CONTENTS PART VI.

No. 15 . Report of the Agricultural and Experimental Union of Ontario for the year 1899. Presented to the Legislature, 26th March, 1900. *Printed.*

No. 16.. Report of the Fruit Growers' Association of Ontario for the year 1899 Presented to the Legislature, 23rd April, 1900 *Printed.*

No. 17.. Report of the Fruit Experiment Stations of Ontario for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 18.. Report of the Superintendent of Spraying for the year 1899. Presented to the Legislature, 12th March, 1900. *Printed*

No. 19.. Report of the Entomological Society of Ontario for the year 1899. Presented to the Legislature, 21st March, 1900. *Printed.*

No. 20. Report of the Bee Keepers' Association for the Province for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

No. 21.. Report of the Poultry Associations of the Province for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

CONTENTS PART VII.

No. 22.. Report of the Cheese and Butter Associations of the Province for the year 1899. Presented to the Legislature, 23rd April, 1900 *Printed.*

No. 23.. Report of the Live Stock Associations of the Province for the year 1899, Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 24.. Report of the Superintendent of Farmers' Institutes of the Province for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 25.. Report of the Provincial Instructor in Road Making in Ontario for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

CONTENTS PART VIII.

No. 26.. Report of the Bureau of Industries for the year 1899. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 27.. Report of the Ontario Game and Fish Commissioners for the year 1899. Presented to the Legislature, 6th April, 1900. *Printed.*

No. 28.. Report of the Department of Immigration for the year 1899. Presented to the Legislature, 28th March, 1900. *Printed.*

No. 29.. Report of the Inspector of Division Courts for the year 1899. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 30.. Report of the Inspector of Legal Offices for the year 1899. Presented to the Legislature, 9th March, 1900. *Printed.*

No 31.. Report of the Inspector of Registry Offices for the year 1899 with statement of fees and emoluments of Registrars. Presented to the Legislature, 23rd April, 1900. *Printed.*

No 32.. Report of the Provincial Board of Health for the year 1899. Presented to the Legislature, 25th April, 1900. *Printed.*

CONTENTS PART IX.

No. 33.. Report of the Secretary and Registrar of the Province for the year 1899. Presented to the Legislature, 25th April, 1900. *Printed.*

No. 34.. Report upon the Lunatic and Idiot Asylums for the Province for the year ending 30th September, 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

No. 35.. Report upon the Common Gaols, Prisons and Reformatories of the Province for the year ending 30th September, 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 36.. Report upon the Hospitals of the Province for the year ending the 30th September, 1899. Presented to the Legislature, 28th March, 1900. *Printed.*

No. 37.. Report upon the Institution for the Education of the Blind, Brantford, for the year ending 30th September, 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 38.. Report upon the Institution for the Education of the Deaf and Dumb, Belleville, for the year ending 30th September, 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

CONTENTS PART X.

No. 39.. Report of the Work under the Children's Protection Act for the year 1899. Presented to the Legislature, 15th March, 1900. *Printed.*

No. 40.. Report on the working of the Tavern and Shop Licenses Acts for the year 1899. Presented to the Legislature, 6th March, 1900. *Printed.*

No. 41.. Report of the Provincial Municipal Auditor for the year 1899. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 42.. Return from the Record of the several Elections of the Legislative Assembly in the Electoral Divisions of West Peterborough, South Renfrew, East Elgin, West Elgin, South Brant, and East Middlesex, since the General Election of March 1st, 1898, shewing:—(1) The number of Votes polled for each Candidate in the Electoral District in which there was a contest. (2) The majority whereby each successful Candidate was returned. (3) The total number of Votes polled in each District. (4) The number of Votes remaining unpolled. (5) The number of names on the Voters' Lists in each District. (6) The population of each District as shewn by the last Census. Presented to the Legislature, 20th February, 1900. *Printed.*

No. 43.. Report of the Commission of Enquiry, concerning the operation of the San José Scale Act, 1899. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 44.. Report of the Inspector of Fumigation Appliances for the year 1899. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 45.. Report of the Librarian on the state of the Library. Presented to the Legislature, 14th February, 1900. *Not printed.*

No. 46.. Copy of an Order-in-Council, approved by His Honour the Lieutenant-Governor the thirty-first day of January, 1900, directing that a Commission be appointed to enquire into matters connected with the election for the West Riding of Elgin, and also a copy of the Commission issued thereunder. Presented to the Legislature, 15th February, 1900. *Printed.*

No. 47.. Copy of a Commission appointing Messieurs Hoskin, Walker and Kirkland, Commissioners to enquire into the Financial affairs of the Province of Ontario. Presented to the Legislature, 19th February, 1900. *Printed.*

No. 48.. Report by Prof. James Mavor on Workmen's Compensation for Injuries. Presented to the Legislature, 25th April, 1900. *Printed.*

No 49.. Copy of Agreement between Her Majesty, represented by the Honourable the Commissioner of Crown Lands, of the one part, and the Blanche River Pulp and Paper Company, Limited, of the other part, and bearing date on the 14th April, 1900. Presented to the Legislature, 23rd April, 1900. *Printed.*

No. 50.. Copy of Agreement with the Spanish River Pulp and Paper Company Limited. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 51.. Awards of the Arbitrators on the Unsettled Accounts between the Dominion of Canada and the Provinces of Ontario and Quebec. Presented to the Legislature, 13th March, 1900. *Printed.*

No. 52.. Statement as to distribution of the Statutes, Revised and Sessional, for the year, 1899. Presented to the Legislature, 7th March, 1900. *Not Printed.*

No. 53.. Return to an Order of the House of the Seventeenth day of March, 1899, for a Return shewing specificially the nature and amount of each investment now outstanding of the moneys or funds of infants and others in Court, the date when each such investment was made, the rate of interest the same bears, when and how payable, and the security held for each of such investments. Presented to the Legislature, 7th March, 1900. Mr. *Carscallen. Not Printed.*

No. 54.. Return to an Order of the House of the Sixth day of March, 1900, for a Return of copies of all correspondence in connection with the appointment of Donald McNiven, as a fishery officer for Lake Simcoe, together with copies of all reports made by him. Presented to the Legislature, 7th March, 1900. Mr. *Thompson. Not Printed.*

No. 55.. Return to an Order of the House of the Seventeenth day of March, 1899, for a Return shewing the total amount of moneys now on deposit in, or subject to the control and distribution of the Supreme Court of Judicature for Ontario, or either division thereof; the style of cause of each action or proceeding in which such moneys have been so paid in, and the County in which each action or proceedings was commenced, as far as practicable, together with the amount now standing to the credit of each such action or proceeding; the names of the persons by whom such payments were respectively made, and on what account, where practicable; the names of and last known addresses of the persons entitled thereto, in all cases in which no payment out of Court has been made within the last ten years, so far as appears by the books and papers in the office of the Accountant of the Supreme Court of Judicature for Ontario, and the amounts due to such persons respectively, so far as appears by the said books. Presented to the Legislature, 9th March, 1900. Mr. *Carscallen. Not printed.*

No. 56.. Regulations *in re* Staking out Locations under Mines Act, in the unsurveyed territory of Ontario. Presented to the Legislature, 12th March, 1900. *Printed.*

No. 57.. Reported on Tenders for Departmental and Legislative Printing and Binding, and Contract with Warwick Bro's & Rutter. Presented to the Legislature, 15th March, 1900. *Printed.*

No. 58.. Copy of Order in Council directing the payment of Surplus Surrogate fees to His Honour Judge Doyle. Presented to the Legislature, 16th March, 1900. *Not Printed.*

No. 59.. Return to an Order of the House of the twenty-second day of March, 1899, for a Return of copies of all papers and correspondence between any member of the Government and any individual with respect to the audit asked for by citizens of the Town of Amherstburg, of the accounts of the local collector. Presented to the Legislature, 21st March, 1900. Mr. *Reid, (Addington.) Not Printed.*

No. 60.. Return to an Order of the House of the twenty-first day of March, 1900, for a Return of copies of all instructions issued by the Department to the inspector or commissioners of the County of Grenville, referring to application for hotel licenses in the Village of North Augusta in the County of Grenville, for the last four years, and all reports from the commissioners and inspector in relation thereto. Presented to the Legislature, 22nd March, 1900. Mr. *Joynt*. *Not Printed.*

No. 61.. Copy of an Order-in-Council commuting the Surrogate Court fees payable to His Honour Judge Morson. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No. 62.. Copy of an Order-in-Council respecting the payment to certain Judges mentioned therein of surplus Surrogate fees. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No. 63.. Copy of an Order-in-Council directing that the bonds or guarantee policies of certain insurance companies mentioned therein may be given and accepted as security under the Statutes of Ontario. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No. 64.. Copy of an Order-in-Council commuting the fees of His Honour Judge Barron as Local Master at Stratford. Presented to the Legislature, 22nd March, 1900. *Not Printed.*

No 65.. Analysis of Reports of District, Township, Agricultural and Horticultural Societies for the years 1887, 1888 and 1889. Presented to the Legislature, 28th March, 1900. *Not Printed.*

No. 66.. Return to an Order of the House of the sixteenth day of March, 1900 for a Return of copies of all correspondence in connection with the appointment of Frederick Warren as Division Court Clerk in the Township of Osnabruck in the County of Stormont. Presented to the Legislature, 28th March, 1900. Mr. *McLaughlin*. *Not Printed.*

No. 67.. Return to an Order of the House of the sixth day of March, 1900, for a Return shewing:—

1st. The name and salary of each License Inspector in the Province for the year 1899, and the County for which he was appointed.

2nd. The amount allowed each such Inspector for expenses.

3rd. The names of License Commissioners in each License District and the amount of expenses allowed to each in the year 1899. Presented to the Legislature, 29th March, 1900. Mr. *Marter*. *Not printed.*

No. 68.. Report of the Master of Titles for the year 1899. Presented to the Legislature, 4th April, 1900. *Not printed.*

No. 69.. Return to an Order of the House of the first day of March, 1899, for a Return giving information under the following heads, respecting bonuses and exemptions to manufacturing industries granted by each municipality in the Province since the year 1870:—1. Amount

of aid by way of absolute bonus and the names of firms or companies receiving same. 2. Amount of aid by way of loan, with names of firms or companies receiving same and the amount of such loan or loans repaid to each municipality. 3. Number of factories which have been granted exemptions from taxation in whole or in part, and approximately the amount of such exemption based on municipal assessors' estimate of the rateable property of each industry. 4. Number of firms or companies which have received municipal aid in any form, more than once 5. Number of such firms or companies which have failed or removed from the municipalities which gave them aid by way of bonus, loan or exemption. Presented to the Legislature, 4th April, 1900. Mr. *Tattullo. Not printed.*

No. 70.. Return to an Order of the House of the seventh day of March, 1900, for a Return of copies of all correspondence between the Government or any member thereof, or any official of the Government and the County Crown Attorney of Elgin, or any other person, in connection with the cases of Queen *vs.* Bole, and Queen *vs.* Cahill. Presented to the Legislature, 4th April, 1900. Mr. *McDiarmid. Not printed.*

No. 71.. Return to an Order of the House of the twenty sixth day of March, 1900, for a Return shewing names, or the official numbers, of Boys reprieved from the Penetanguishene Reformatory, and of Girls reprieved from the Industrial Refuge for Girls, Toronto, during the two years previous to the first February, 1900. The date when the reprieve was recommended by the Warden or Superintendent. The date when the reprieve was finally granted. Presented to the Legislature, 4th April, 1900. Mr. *Pyne. Not printed.*

No. 72.. Return to an Order of the House of the sixth day of April, 1900, for a Return, shewing the quantity of binder twine sold during the season of 1899. To whom sold, with names of purchasers and price *per* pound received. Shewing as well, the names of persons still indebted to the Government, and to what amount, in each case. Presented to the Legislature, 6th April, 1900. Mr. *Duff. Not printed.*

No. 73.. Report of the Registrar of Live Stock for the year 1899. Presented to the Legislature, 9th April, 1900. *Printed.*

No. 74.. Commercial Report of the Canadian Section of the Imperial Institute. Presented to the Legislature, 10th April, 1900. *Not printed.*

No. 75.. Return to an Order of the House of the seventh day of March, 1900, for a Return shewing the salary paid to Mr. John Hoskin as Official Guardian. The number and names of the clerks in his office with dates of appointment, and the salary paid by Government to each. Also shewing what other emoluments are received by Mr. Hoskin as such Official Guardian each year, and what amount of other emoulment, if any, was so received or earned by Mr. Hoskin for the year 1899 in his capacity as such official guardian. Presented to the Legislature, 10th April, 1900. Mr. *Whitney. Not Printed.*

No. 76.. Return to an Order of the House of the second day of April, 1900, for a Return shewing amount of Revenue received during the year 1899, by each of the Departments of Government as audited and passed by the Commission appointed to investigate and report as to the Finances of the Province. Presented to the Legislature, 10th April, 1900. Mr. *Miscampbell*. *Not printed.*

No. 77.. Return to an Order of the House of the sixteenth day of March, 1900, for a Return stating the number of hours female *employés* in factories have to work each day. Also the minimum amount of wages paid *per* day to any female *employé* under the Factory Act. Also, whether separate sanitary conveniences are supplied where male and female *employés* are working, under the Factory Act. And shewing as well what system of Government inspection the factories are now under. Presented to the Legislature, 11th April, 1900. Mr. *Pyne*. *Not printed.*

No. 78.. Return to an Order of the House of the nineteenth day of March, 1900, for a Return of copies of all correspondence between any member of the Government and any official thereof relating to the distribution of the Statutes. Presented to the Legislature, 18th April, 1900. Mr. *Carnegie*. *Not Printed.*

No. 79.. Agreement between the Commissioners of the Queen Victoria Niagara Falls Park and the Ontario Power Company of Niagara Falls, dated 11th day of April, 1900. Presented to the Legislature, 17th April, 1900. *Not printed.*

No. 80.. Agreement between Her Majesty, represented by the Honourable the Commissioner of Crown Lands of the first part and The Nepigon Pulp, Paper and Manufacturing Company, Limited, of the other part, bearing date on the 18th April, 1900. Presented to the Legislature, 20th April, 1900. *Printed.*

No. 81.. Return to an Order of the House of the fourteenth day of March, 1900 for a Return shewing the number of dates and places of sittings of the County and Districts Courts, and Courts of General Sessions of the Peace, Oyer and Terminer and General Gaol delivery and of the High Court of Justice, respectively, held in the various county and district towns of the Province, during the years 1895 to 1899, both inclusive:—

(*a*) At which there has been no business to be tried before the petit jury,—

(*b*) At which there has been no action, matter or other proceedings to be tried by a judge without a jury,—

(*c*) At which there have been no indictments laid before the Grand Jury. Presented to the Legislature, 23rd April, 1900. Mr. *Hoyle*. *Not printed.*

No. 82.. Return to an Order of the House of the fourth day of April, 1900, for a Return of copies of all correspondence and papers, between any member of the Government, or any official thereof, or any other person or persons, in reference to a claim made by the Counties of

Leeds and Grenville against the Government *re* Criminal Justice Account shewing as well, the balance due the Counties. Presented to the Legislature, 23rd April, 1900. Mr. *Joynt*. *Not printed.*

No. 83.. Report of Upper Canada College and Bursars Statement, for the year 1899. Presented to the Legislature, 26th April, 1900. *Printed.*

No. 84.. Return to an Order of the House of the ninth day of April, 1900, for a Return of copies of all correspondence between the License Commissioners or License Inspector for the East Riding of the County of Lambton, or any person, relating to the issuing of a Liquor License in the Village of Thedford for the year 1900. Presented to the Legislature, 26th April, 1900. Mr. *Marter*. *Not Printed.*

TWENTY-FIRST ANNUAL REPORT

OF THE

ONTARIO

AGRICULTURAL AND EXPERIMENTAL UNION

1899.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF THE
LEGISLATIVE ASSEMBLY OF ONTARIO

TORONTO:
WARWICK BRO'S. & RUTTER, PRINTERS.
1900.

TWENTY-FIRST ANNUAL REPORT

OF THE

AGRICULTURAL AND EXPERIMENTAL UNION

OF ONTARIO

1899.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—I have the honor to present herewith the Twenty-first Annual Report of the Ontario Agricultural and Experimental Union.

Your obedient servant,

C. A. ZAVITZ,
Secretary.

Ontario Agricultural College,
Guelph, December 30th, 1899.

ONTARIO AGRICULTURAL AND EXPERIMENTAL UNION.

1899-1900.

Officers.

President	H. R. Ross, Gilead, Ont.
Vice-President	Thomas Mason, Straffordville, Ont.
Secretary and Editor	C. A. Zavitz, Agricultural College, Guelph, Ont.
Treasurer	H. L. Hutt, Agricultural College, Guelph, Ont.
Directors	Dr. Jas. Mills, N. Monteith, M.P.P. G. C. Creelman, B. Pickett, and C. A. Zavitz

Committees on Experimental Work.

Agriculture	C. A. Zavitz (Director), Dr. James Mills, J. Buchanan, and G. H. Clark.
Horticulture	Prof. H. L. Hutt (Director), F. R. Mallory, and C. E. Woolverton.
Dairying	Prof. H. H Dean (Director), R. W. Stratton, and J. A. McFeeters.
Economic Botany	W. M. Doherty (Director), J. M. Reade, and J. A. Robertson.
Economic Entomology	Prof. Lochhead (Director), F. R. Marshall, and W. N. Hutt.
Soil Physics	Prof. J. B. Reynolds (Director), I. I. Devitt, and M. Raynor
Poultry	W. R. Graham (Director), E. C. Drury, and W. J. Black.
Auditors	G. A. Putnan and Robert Harcourt.

ONTARIO ARGICULTURAL AND EXPERIMENTAL UNION

ANNUAL MEETING.

The Twenty-first Annual Meeting of the Ontario Agricultural and Experimental Union was held at the Ontario Agricultural College, Guelph, commencing on the evening of December 6th and closing on the afternoon of December 8th, 1899.

The Chairman for the day sessions was Mr. H. L. Beckett, B.S.A., President of the Union, and the Chairman for the evening meeting was Dr. Jas. Mills, President of the College.

PRESIDENT'S ADDRESS.

Mr. H. L. Beckett, B.S.A., Hamilton, Ont.

Once again we are met together to hold the annual meeting of the Experimental Union. Since our last meeting, another year has gone by, with all its opportunities and difficulties. Let us hope that the most has been made of the opportunities, and that the various difficulties have but spurred us on to greater achievements in the future. Unfortunately, during the past season, a large portion of the Province was visited by unusual drouth, which was severely felt, more especially by dairymen, showing that we must depend more upon the growth of soiling crops and less upon pasturing. The unusual severity of the past winter had a very disastrous effect upon the winter wheat crop, in many cases almost completely ruining it. In spite of this, however, I am happy to say that the past year has been a fairly successful one, the farmer receiving his share of the general revival of trade.

To the visitors, ex-students and students of the College, I extend a hearty welcome to this the twenty-first annual meeting of the Union, to listen to the results of the past year's work and to join in the discussions, and I hope that you may all be pleased and profited by your attendance. The Union has now attained its majority, and bids fair to fulfil its early promise of growth and usefulness. While the growth from the first has been steady, it is only comparatively recently that it has made its influence felt outside of its members and those immediately interested in such work. Now, however, things have changed. The results of the various experiments are looked forward to and carefully studied by farmers and seedsmen from one end of Ontario to the other. This is shown by the rapid introduction throughout the Province of varieties of grain and fodder crops which have proved themselves to be superior in regard to yield and hardiness, to the old and well-known varieties. In fact, the direct benefit to agriculture can scarcely be conceived. In addition to this, the experimenters themselves have received great good from the work, through the lessons they have received in accuracy, observation and carefulness. While the results have been so good in the past, there is no reason why we may not look forward to greater things in the future. The Union has now a trained corps of experimenters—men from whom good results may be expected—and the question may be asked, why should we look for more, and in many cases, no doubt, less careful ones? We must remember, however, that the experiments that are apparently conducted with the greatest accuracy and show the most reliable results are not always those that do the greatest amount of good. While for some reason or other the returns may not have been complete in every particular, still the experimenter may have had a new field opened up to him. He has been taught to think and act for himself, not to depend blindly on others. He has been taught to inquire into the reason for the success or failure of particular crops or particular varieties. He has been taught observation, and care, and accuracy in little things, which we all, as farmers, very much require to learn. And in this way the benefits may be very great, although we may never hear of them.

During the past year, agricultural experiments have been conducted upon some 3,485 farms throughout Ontario, showing a very substantial increase. In horticulture, also, the

numbers were largely in advance of former years, while the Committees in Botany and Soil Physics have not been idle. We can point with pride to our record in the past; we can look into the future with confidence that the Union will give a good account of whatever funds may be entrusted to it.

I am very pleased to say that the ex-students are showing greater interest than ever before in the work of the Union, and in this connection I might mention the fact that a donation of $25 has been received from an ex-student in England. I certainly think that greater efforts should be made in the future towards keeping up the interest of the ex-students in the Union and in the College, and in making this annual meeting a re-union to which they will look forward with expectation and remember with pleasure. The officers had hoped to have a more suitable hall for the meetings, but, unfortunately, those in authority have ordered otherwise. We will hope, however, that before another year has passed we may be better provided for in this respect.

In conclusion, let me ask you all to do your best to make this meeting the most successful in the history of the Union. Let each make it a point as far as possible to be present at all the meetings, ask questions upon any points that may not be clear, and take an active part in the discussion; and I think I can safely promise that you will go home both pleased and profited.

CO-OPERATIVE EXPERIMENTS IN AGRICULTURE.

C. A. Zavitz, B.S.A., Director of Co-operative Experiments in Agriculture, O. A. C., Guelph.

At the last annual meeting of the Experimental Union, eight different committees were appointed to plan co-operative experimental work in Horticulture, Live Stock, Diarying, Bee-keeping, Economic Botany, Economic Entomology, Soil Physics and Agriculture. The Committee on Agriculture consisted of Dr. Mills, John Buchanan, G. H. Clark and myself. I am glad to be able to say that our co-operative work in agriculture has again been successful, and in fact I believe I am justified in saying that it has been even more successful than in any year previous to 1899. We had a greater number of experimenters; we sent out more experimental material; and we have received a larger number of reports of successfully conducted experiments this year than on any former occasion. The number of distinct experiments in agriculture conducted in 1899 was twenty-three, being four more than in 1898, five more than in 1897, seven more than in 1896, and eight more than in 1895. These co-operative experiments extend into every county and district of Ontario, and we might almost say into every township, and even into every neighborhood of the Province. From the kind words which have reached us, as well as from the good reports which have been received from those who have been carrying on these co-operative experiments during the past year, we are greatly encouraged in the work and are fully convinced that a large amount of good is being derived from these experiments by the experimenters themselves and by the farmers generally.

It is very pleasing to know that those most active in the work of the Farmers' Institutes of Ontario are showing a deep interest in the co-operative experiments in agriculture. In the spring of the present year we sent copies of the following letter to the presidents and to the secretaries of the various institutes of the Province:

Ontario Agricultural College,
Guelph, March 25th, 1899.

Dear Sir,—We are much pleased with the interest which has been taken in the co-operative experiments in agriculture by those most closely associated with the Farmers' Institutes of Ontario. Co-operative experiments have been successfu ly conducted by no less than 67 of the present officers and 114 of the present directors of the Institutes. In many meetings which I have attended most valuable discussions have taken place on the results of the experiments conducted in the different localities. I believe that an hour or so at each Institute meeting could be devoted to discussions of this kind to great advantage to the members. I have, therefore, this year sent a circular of the co-operative experiments to each Institute officer and director in Ontario. Five extra copies are now being sent to each president, and also five extra copies

to each secretary, which must be placed in the hands of men who would likely conduct the experiments this season, and take part in the discussions in connection with your Institute meetings next winter. All applications, however, should reach here within the next ten days. The number of experimenters this year is likely to be larger than ever, as about eight hundred applications have been received within the last week. If the results of experiments conducted in different localities were published in the local papers, I believe much good would be accomplished.

I would be glad to hear from you on these points at any time.

Yours truly,
C. A. ZAVITZ,
Director.

In order to more fully understand the connection between the co-operative experimental work of the Union and the agriculture of the Province, I will first direct your attention to the number of acres used for each farm crop in Ontario in 1899, then to the number of varieties of each farm crop which has been tested in the plots at the Agricultural College within the past thirteen years, and lastly to the number of varieties of each farm crop which was tested over Ontario in 1899.

FARM CROPS IN ONTARIO.

CROPS.	Acres in Ontario, 1899.	VARIETIES TESTED.	
		At O.A.C. within 13 years.	Over Ontario in 1899.
Hay and clover	2,505,422	72	8
Oats	2,363,778	218	4
Winter wheat	1,049,691	159	7
Peas	743,139	100	5
Corn	505,525	226	6
Barley	490,374	95	4
Spring wheat	398,726	144	3
Potatoes	168,148	241	6
Turnips	153,440	183	4
Rye	137,824	6	1
Buckwheat	132,082	6	3
Mangel Wurzels	53,401	102	4
Beans	46,485	41	6
Carrots	11,891	60	4

Some other crops not mentioned in the table were also distributed for co-operative testing and may be enumerated as follows:—Millets, four varieties; sugar beets, one variety; and leguminous crops, two varieties. Besides these varieties, material was supplied for fertilizer experiments, tests in cultivation, tests in dates of seeding, etc.

The next table shows the gradual but substantial increase in the Union experiments in agriculture for the past fourteen years.

Years.	Experiments.	Experimenters.	Satisfactory Reports.
1886	1	12	8
1888	1	90	40
1891	12	203	126
1892	12	754	295
1893	13	1,204	416
1894	14	1,440	504
1895	15	1,699	513
1896	16	2,260	501
1897	18	2,835	610
1898	19	3,028	667
1899	23	3,485	739

The best feature shown by these figures is that the number of successfully conducted experiments is increasing from year to year.

The following circular was sent out in the spring of the present year and gives the list of experiments as well as other information regarding the work:

Ontario Agricultural College, Guelph, March, 1899.

Dear Sir,—

The members of the Committee on Co-operative Experiments in Agriculture are pleased to state that for 1899 they are again prepared to distribute into every township of Ontario material for experiments with fertilizers, fodder crops, roots, grains, grasses and clovers. Upwards of 1,000 varieties of farm crops have been tested in the Experimental Department of the Ontario Agricultural College, Guelph, for at least five years in succession. These consist of nearly all the Canadian sorts, and several hundred new varieties imported by the Experimental Department, from different parts of Europe, Asia, Africa, Australia and the United States. Some of these have done exceedingly well in the carefully conducted experiments at the College, and are now being used for co-operative experiments throughout Ontario.

This system of co-operative experimental work in Agriculture was started in 1886 with 60 plots, which were situated on 12 different farms in Ontario. Since that date, however, the work has increased from year to year, and in 1898 there were 12,357 plots, which were situated on 3,028 farms throughout Ontario.

Each person in Ontario who wishes to join in the work may choose any one of the experiments for 1899, fill out the accompanying form of application, and return the same to the Director of the Co-operative Experiments in Agriculture at as early a date as possible. The material will be furnished in the order in which the applications are received until the supply is exhausted. A sheet containing the instructions for conducting the chosen experiment, and the blank form on which to report the results of the work, will be sent to each experimenter at the time the fertilizers or seeds are forwarded. All material will be furnished entirely free of charge to each applicant, and the produce of the plots will, of course, become the property of the person who conducts the experiment. In return, the Committee desires to ask that each experimenter will sow all the plots belonging to the particular experiment which he has chosen for 1899, and that he will be very careful and accurate in his work, and forward to the Director a complete report of the results obtained from the test, as soon as possible after the plots are harvested.

All fertilizers and seeds will be sent in good time for spring seeding, providing the applications are received at an early date. The supply of material being limited, those who apply first will be surest of obtaining the desired outfit. It might be well for each applicant to make a second choice for fear the first could not be granted. The experiment selected should be indicated by using the numbers given in the left hand column in the list of experiments.

Some Advantages of these Co-Operative Experiments.

The Union furnishes a good method by which farmers can secure pure seed of the best varieties of grain, root, fodder, silage, and hay crops to test on their own soil, and thus find out in a very practical way which special kinds are best suited to their own particular farms.

Experimental work encourages careful handling, close observation, accurate calculation, and economical methods.

Experimenters get a start in pure seeds of the best varieties of grain crops which rapidly increases in quantity, thus furnishing seed for sowing on large areas and for selling at good prices.

The co-operative experiments located on over three thousand Ontario farms form object lessons for the farmers in their respective neighborhoods.

Farmers are frequently enabled to purchase pure seed of leading varieties of grain from their neighbors who are successful experimenters.

Summary results and important conclusions from successfully conducted co-operative experiments are printed annually in the report of the Experimental Union, which is distributed in large numbers from the Department of Agriculture, Toronto, Ontario.

Important features of the experiments are frequently discussed in the field, at the fireside, and in the meetings of farmers' institutes.

Results of experiments conducted by other farmers and by the Experiment Stations are read and studied with increased interest.

Properly conducted experimental work adds pleasure to farm life, and forms a very wholesome influence in keeping the boys on the farm.

The whole system leads to a substantial increase in farm profits and to a steady advance in agricultural education throughout Ontario.

Comments by Experimenters.

"As a result of my ex eriments, I grow more bushels to the acre and make more money on my farm.' Geo. Hoff, Grey Co.

"The Experimental Union has done a grand work for Ontario. I think we have nothing in the Province that has done so much good to the farmers and to the country at large."

F. W. Heacock, York Co.

"I think your system is a good one. It is well conducted, is a credit to those who conduct it, and will have a bright future."—A. G. Smillie, Huron Co.

"I have experimented and have thus secured the varieties best suited for my own soil, and have sold seed of the best varieties to my neighbors, who have been benefited thereby."—Frank Shuh, Waterloo Co.

"I have learned by my experiment that it may make a difference in yield of 16 bushels per acre by using one variety in preference to another."—E. M. Husband, Middlesex Co.

"I have derived great benefit from the Union. By using new varieties of seed, I have more than doubled my crop."—G. W. Beckett, Welland Co.

"I have experimented seven years, and I know that the Union is doing an incalculable amount of good for the Province. Just to give one illustration that came under my own personal observation, I wish to say that I had an experiment with barley on small plots, and from that experiment I obtained one variety called the Mandscheuri, which has been worth to the county of Glengarry alone thousands and thousands of dollars."—R. R. Sangster, Glengarry Co.

"By an experiment with oats, I introduced an early variety into our section, which has been of material advantage to the farmers, and is now generally grown by them."—Nelson Monteith, M.P.P., Perth Co.

"There are many thousand bushels of Siberian oats and of Dawson's Golden Chaff winter wheat in our locality, all grown from the experimental packages you sent me."—David Kiernan, Dufferin Co.

"Good varieties are essential to good crops."—John Firth, Grey Co.

"The experiment actually became the leading topic of the village talk."—J. E. Frith, Oxford Co.

List of Experiments for 1899.

Application of Fertilizers.

Nos.		Plots.
1.	—Testing nitrate of soda, superphosphate, muriate of potash, mixture, and no manure, with Corn	5
2.	—Testing nitrate of soda, superphosphate, muriate of potash, mixture, and no manure, with Mangels	5

Fodder Crops.

3.	—Growing Grass Peas and two varieties of Vetches for green fodder	3
4.	—Growing three mixtures of grain for green fodder	3
5.	—Testing six varieties of Corn for grain, fodder, or silage	6

Hay Crops.

6.	—Testing four varieties of Millet	4
7.	—Testing four varieties of Grasses	4
8.	—Testing four varieties of Clovers	4

Grain Crops.

9.	—Testing three varieties of Buckwheat	3
10.	—Testing three varieties of Spring Wheat and one variety of Spring Rye	4
11.	—Testing four varieties of Barley	4
12.	—Testing four varieties of Oats	4
13.	—Testing four varieties of Field Peas	4
14.	—Testing three varieties of Field Beans	3
15.	—Testing three varieties of Japanese Beans	3

Root Crops.

16.	—Testing four varieties of Carrots	4
17.	—Testing three varieties of Mangels and one variety of Sugar Beets	4
18.	—Testing two varieties of Swedish, and two varieties of Fall Turnips	4

Miscellaneous.

19.	—Sowing Peas at different dates to determine the amount of injury done by the pea weevil. (Early or late peas can be sent as desired)	4
20.	—Planting Potatoes the same day and five days after being cut. (Early or late Potatoes can be sent as desired	2
21.	—Planting Corn in rows and in squares. (Dent or Flint Corn can be sent as desired	2

The size of each plot in each of the first eight experiments is two rods long by one rod wide, and in each of the remaining experiments one rod square, except in experiment No. 21, when each plot is to be four rods square (1-10th of an acre).

Material for either No. 1 or No. 2 experiment will be sent by express, and for each of the others it will be forwarded by mail.

Particular varieties need not be mentioned, as the kinds to be distributed are those which have done exceptionally well for several seasons in succession in the Experimental Department of the Agricultural College.

Address all communications to

C. A. Zavitz, Agricultural College, Guelph, Ont.

We have examined all the reports which have been received, and have discarded every report which showed any sign whatever of inaccuracy. Every experimenter who did not conduct the experiment with the full amount of material; who did not use plots of exactly the right size; who did not give the yield, etc., of the different plots; or who showed any inaccuracy in his work in any way, will not find his name in the list of those whose reports were used in making up the summaries here presented. We have, therefore, included in these summaries nothing but the results which were obtained from carefully-conducted experiments. While the summaries should be of great value to the farmers generally, still those who conducted the experiments have obtained much additional information regarding the results of their experiments as adapted to their individual circumstances.

The experimenters deserve much credit in successfully conducting the various experiments during the past season; and the farmers of Ontario owe much to these experimenters for the valuable reports which they have furnished, and which are here presented in summary form.

LIST OF EXPERIMENTERS.

The following list gives the names of those who furnished satisfactory reports of carefully conducted experiments in 1899:

Experimenter.	Post Office.	County.	Experiment.
1. Smith, H. L	Jerseyville	Wentworth	Fertilizers with corn.
2. Littlejohn, R. W	Ridgetown	Kent	"
3. Jamieson, John	Meaford	Grey	"
4. Leslie, Jas	Blenheim	Kent	"
5. Brown, J. W	Chard	Prescott	"
6. McAsh, Wilson	Barnett	Huron	"
7. Green, Bismark	Oakleaf	Leeds	"
8. O. A. C	Guelph	Wellington	"
9. Wheatley, T. C	Blackwell	Lambton	Fertilizers with mangels.
10. McCracken, J. F	Bluevale	Huron	"
11. Ridgeway, P. F	Christina	Middlesex	"
12. Moss, D A	Lyons	Elgin	"
13. Brodie, Jas	Vandeleur	Grey	"
14. Watson, Mahlon	Springvale	Haldimand	"
15. Mackey, Hugh	Peterboro	Peterboro	"
16. O. A. C	Guelph	Wellington	"
17. Collinson, F	Scotia	Parry Sound	Leguminous crops.
18. Lancaster, John	Westwood	Peterboro	"
19. Krung, N. V	Dixon	Renfrew	"
20. O. A. C	Guelph	Wellington	"
21. Stringer, W. M	Dunnville	Haldimand	"
22. Shultz, H. A	Clontarf	Renfrew	Grain for green fodder.
23. Perry, Mrs. W	Bellingham	Algoma	"
24. O. A. C	Guelph	Wellington	"
25. McVannell, D	St. Marys	Perth	Corn.
26. Lamb, Lewis	Kincardine	Bruce	"
27. Brown, Louis	Norwood	Peterboro	"
28. Leighton, F. W	South River	Parry Sound	"
29. Tillson, T. D	Tilsonburg	Oxford	"
30. Carmody, John J	Siloam	Ontario	"
31. Pound, Milton	Ridgeway	Welland	"
32. Forbes, Harry	Jeannette's Creek	Kent	"
33. Beamer, Harry	Simcoe	Norfolk	"
34. Way, John C	Merlin	Kent	"
35. Clough, L. H	Hepworth	Bruce	"
36. Thompson, Hugh	Magnetawan	Parry Sound	"
37. Leavitt, A. S	Vankleek Hill	Prescott	Millet.
38. Dillon, Jas	Calabogie	Renfrew	"
39. Peck, Francis	Minden	Haliburton	"
40. Blake, Chas	Ompah	Frontenac	"
41. Kranz, N	Golden Lake	Renfrew	"
42. Hartman, Walter	Clarksburg	Grey	Grasses sown in 1897.
43. Stimpson, Fred	Lancelot	Muskoka	" "
44. Phin, H. L	Courtice	Durham	" 1898.
45. Tiegs, Theodore	Augsbourg	Renfrew	" "
46. Cranley, John, Sr	Douro	Peterboro	" 1899.
47. Green, G. E	Manitowaning	Algoma	Clovers sown in 1899.
48. Armstrong, Geo	Avonmore	Stormont	" "
49. McArthur, A. C	Martintown	Glengarry	" "
50. Musgrove, Geo. A	Walsingham Centre	Norfolk	" "
51. Rumbelow, Sam	Minden	Haliburton	" "
52. Boldt, Adolph	Kinmount	"	" 1898.
53. Ferguson, J. A	Ventry	Grey	Buckwheat.
54. Hutton, J. A	Joyceville	Frontenac	Spring wheat.
55. Abbott, Geo	Wooler	Northumberland	"
56. Robinson, T. G	Sault Ste. Marie	Algoma	"
57. Farquharson, Andrew	Woodford	Grey	"
58. Bell, Geo	Lindenwood	"	"
59. Cummings, John	Almonte	Lanark	"
60. Kelly, John	Smoky Falls	Nipissing	"
61. Thompson, Wells	Orrville	Parry Sound	"
62. Emberson, F. A	Hillside	Musk ka	"
63. Curry, Wm	Ayr	Oxford	"
64. Bennett, F. G	Spencerville	Grenville	"

List of Experimenters.—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
65. Gilmour, S	Tamworth	Addington	Spring wheat.
66. Thompson, W. B	Dobbinton	Bruce	"
67. Walsh, Pat	Erinsville	Addington	"
68. Schrader, Richard	Minden	Haliburton	"
69. McLennan, R. G	Laurier	Huron	"
70. McLennan, Jas	Laurier	"	"
71. Campbell, E. B	Whitley	Lanark	"
72. Fowler, John	Mindemoya	Algoma	"
73. Sweet, Fred	Burnley	Northumberland	"
74. Summerton, Frank	Pakenham	Lanark	"
75. Lovely, J	Corbetton	Dufferin	"
76. Bancroft, G. R	Newington	Stormont	"
77. Butcher, Albert	Beaverton	Ontario	"
78. Cair, T. F	Trout Creek	Parry Sound	"
79. Morrison, David	Horning's Mills	Dufferin	"
80. Rowe, S. H	Stanwood	Northumberland	"
81. Thurman, Arthur	Yearley	Muskoka	"
82. Dawson, Peter	Bailieboro	Northumberland	"
83. Johnston, Albert	Lavender	Dufferin	"
84. Hopkin, David	Tehkummah	Algoma	"
85. Watson, Charlie	Avonmore	Grey	"
86. Ramson, W	Fergus	Wellington	"
87. Morton, Robt	Ashton	Carleton	"
88. Bender, W. W	Harrison's Corners	Stormont	"
89. Hadley, R. S	Gooderham	Haliburton	"
90. Jamieson, Alex	Glenarm	Victoria	"
91. Rolufs, R. M	Mt. Forest	Grey	"
92. Peters, Sam	Atwood	Perth	"
93. Miller, G. R. A	Vallentyne	Ontario	"
94. Haylow, Jas	Oriel	Oxford	"
95. Ferris, Wm	Horning's Mills	Dufferin	"
96. O. A. C	Guelph	Wellington	"
97. McLean, J. K	Berwick	Stormont	Barley.
98. Cornish, W. C	Little Britain	Victoria	"
99. Drimmie, Daniel	Yeovil	Grey	"
100. Craig, John	North Gower	Carleton	"
101. Stoner, L. A	Humberstone	Welland	"
102. Niece, Hosca	Stromness	Haldimand	"
103. Myers, Thos	Russell	Russell	"
104. Ross, Andrew, Sr	Grafton	Northumberland	"
105. Kelly, Richard	Alton	Peel	"
106. Finlay, Wm	Novar	Muskoka	"
107. Foulkes, Jno	Brackenrig	"	"
108. Gies, Ernest	Zurich	Huron	"
109. Simpson, Geo	Nipissing	Parry Sound	"
110. Mountain, Wm	Avonbank	Perth	"
111. Martin, E	Dunchurch	Parry Sound	"
112. Larden, Jas	Cache Bay	Nipissing	"
113. Raitby, Geo	Auburn	Huron	"
114. Walker, A	Metcalfe	Carleton	"
115. Smithrim, R. H	Cairngorm	Middlesex	"
116. Manson, Chas	Eddy Mills	Lambton	"
117. Wilson, Chas	Newmarket	York	"
118. Elliott, John E	Woodbridge	"	"
119. Gardner, W. A	Farquhar	Huron	"
120. Miller, John	Creemore	Simcoe	"
121. Carruthers, John	Mt. Bridges	Middlesex	"
122. Dickins, W. W	Hybla	Hastings	"
123. Miller, Alfred	Boxall	Elgin	"
124. Himsworth, H	Gowanstown	Perth	"
125. Last, Geo	Louise	Grey	"
126. McCall, T. H	Petrolia	Lambton	"
127. Rowand, W. A	Walkerton	Bruce	"
128. Akhurst, A	Greenbank	Ontario	"
129. Callaghan, Jas	Reaboro	Victoria	"
130. Patterson, R	Kirkwall	Wentworth	"
131. Ross, John	Ilderton	Middlesex	"
132. Walker, Thos	Hawthorne	Carleton	"

LIST OF EXPERIMENTERS.—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
133. Eaton, Thos	Byng	Haldimand	Barley.
134. Johnson, H	Nanticoke	Haldimand	"
135. Monkman, R. R	Castlederg	Peel	"
136. Lane, John	Gore Bay	Algoma	"
137. Taylor, Daniel	Massey	Grey	"
138. McCormick, W. R	Powassan	Parry Sound	"
139. McCormick, J. F	Trenton	Northumberland	"
140. Stroud, J. H	Powell's Corners	Victoria	"
141. Reed, D. H	Mimosa	Wellington	"
142. Willison, Thos	Mount Wolfe	York	"
143. Acklan, Robert	Mitchell	Perth	"
144. Newton, J. F	Violet Hill	Dufferin	"
145. Johnston, J., Jr	Lavender	Dufferin	"
146. Percival, W. A	Burritt's Rapids	Grenville	"
147. O. A. C	Guelph	Wellington	"
148. Macfie, C. M	Appin	Middlesex	"
149. Laing, W. J	Motherwell	Perth	Oats.
150. Detwiller, B	Motherwell	Perth	"
151. Holmwood, Geo	Guelph	Wellington	"
152. Dalton, Robert	Victoria Harbor	Simcoe	"
153. Macdonald, M	Lucknow	Huron	"
154. Johnston, Jas	Lavender	Dufferin	"
155. Lee, Edward	Bracebridge	Muskoka	"
156. Wilson, John	Marsville	Dufferin	"
157. Slade, Geo	South End	Welland	"
158. Baxter, J	St Paul's Station	Perth	"
159. Watson, W. J	Malton	Peel	"
160. Coutts, Jas	Ufford	Muskoka	"
161. Peppler, C	West Montrose	Waterloo	"
162. Baird, Geo	Clinton	Huron	"
163. Vary, Ira	Hepworth	Bruce	"
164. Bennett, S. G	Midland	Simcoe	"
165. McAulay, Walter	Bellingham	Algoma	"
166. Pratt, Wm	Penetanguishene	Simcoe	"
167. Martin, W. J	Udney	Ontario	"
168. Wilson, S. J	St Catharines	Lincoln	"
169. Cragg, A. F	Cambray	Victoria	"
170. Elder, B	Peabody	Grey	"
171. Campbell, J. S	Komoka	Middlesex	"
172. Turner, Geo	Aspdin	Ontario	"
173. Semple, W. C	Tottenham	Simcoe	"
174. McAfee, Thos	Rocklyn	Grey	"
175. Edmonston, John	Hoath Head	Grey	"
176. McLellan, John	Forrester Falls	Renfrew	"
177. Brook, Wm	Ashworth	Muskoka	"
178. Bryne, Thos	Kinmount	Victoria	"
179. Duffield, Archie	Bunessan	Grey	"
180. Frame, John	Walkerton	Bruce	"
181. Coffey, Wm	Arkwright	Bruce	"
182. McCrie, W. A	Durham	Grey	"
183. Bennett, C. E	Rodney	Elgin	"
184. Darling, Jas	Mildmay	Bruce	"
185. Johnston, David	Navan	Russell	"
186. McCaskill, Alex	Barb	Prescott	"
187. Bruce, W. G	Inverary	Frontenac	"
188. Virtue, Henry	Vandeleur	Brant	"
189. Dixon, W. L	Dromore	Grey	"
190. Reid, Sam	Thornloe	Nipissing	"
191. Haight, P. C	Wellington	Prince Edward	"
192. Fawell, L. A	DeCewsville	Haldimand	"
193. Bain, J. R	Loring	Parry Sound	"
194. Lain & Sons, R. E	Lanes	Huron	"
195. Bateman, T. M	Empey	Hastings	"
196. Hayward, Robert	Kearney	Parry Sound	"
197. Lyons, Jas. S	Ceylon	Grey	"
198. Jennings, John, Jr	Barry Island	Algoma	"
199. Gillies, Donald	Cambray	Victoria	"
200. Cornish, Wesley	Little Britain	Victoria	"

LIST OF EXPERIMENTERS.—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
201. Fielding, David	Coningsby	Wellington	Oats.
202. Dunn, W. J	Mt. St. Louis	Simcoe	"
203. Jack, John	Corbetton	Dufferin	"
204. Christie, S. W	Martintown	Glengarry	"
205. Dool, Sam	North Rideau	Carleton	"
206. Stonehouse, Geo	Fraserburg	Muskoka	"
207. Maguire, R. G	Rydal Bank	Algoma	"
208. Laidlaw, D. A	Blyth	Huron	"
209. Richmond, John	Blyth	Huron	"
210. Hammill, E. P	Walter's Falls	Grey	"
211. Barton, Jas	Charleyville	Grenville	"
212. Benson, J. W	Eugenia	Grey	"
213. Gringrich, E	Preston	Waterloo	"
214. Pettigrew, Jas	Barrow Bay	Bruce	"
215. Musclow, Chas	Bancroft	Hastings	"
216. Loveley, Isaac	Corbetton	Dufferin	"
217. Cordukes, Thos	Sowerby	Algoma	"
218. Robertson, R. J	Plainville	Northumberland	"
219. Phillipson, John	Palmerston	Wellington	"
220. Merritt, L. A	St. Catharines	Lincoln	"
221. Smith, Robert	Monkton	Perth	"
222. Ney, Wm	Elliott's Corners	Simcoe	"
223. Petapiece, G. E	Manotick	Carleton	"
224. Caldwell, Hugh	Clydesdale	Peterboro	"
225. Medd, David	Dresden	Lambton	"
226. McIlwain, J. W	Heather	Lambton	"
227. Henry, Chas. E	Sombra	Lambton	"
228. Cummings, W. J	Spencerville	Grenville	"
229. Anderson, G. B	Medina	Oxford	"
230. Hartley, E. E	Milton	Halton	"
231. Wood R T	Thistletown	York	"
232. Sherk, J M	Selkirk	Haldimand	"
233. Bond, Thos	Chesterfield	Oxford	"
234. Sloan, Wm	Connor	Simcoe	"
235. Kaiser, Morden	Sunnidale Corners	Simcoe	"
236. Wood, Daniel	Crumlin	Middlesex	"
237. Pritchard, T	Richard's Landing	Algoma	"
238. Walker, Henry	Haysville	Waterloo	"
239. McKnight, Wm	West Port	Leeds	"
240. Trace, John	Elmvale	Simcoe	"
241. Patterson, Jas	Strathroy	Middlesex	"
242. Burns, Simon	Rutherford	Lambton	"
243. Carmichael, Arch	West Lorne	Elgin	"
244. Henderson, T. S	Rockton	Wentworth	"
245. Rose, John	Alliston	Simcoe	"
246. Campbell, C. H	Strathroy	Middlesex	"
247. Day, Nathan	Ridgeway	Welland	"
248. Braden, R. H	Lakefield	Peterboro	"
249. Waterworth, John	Woodgreen	Middlesex	"
250. Ward, H. G	Pig Fork	Algoma	"
251. Tuck, Wm	Coulson	Simcoe	"
252. Stokes, Duncan	Mount Albert	Ontario	"
253. Kidd, S. L	Listowel	Perth	"
254. Reid, Thos	Eganville	Renfrew	"
255. Simpkins, S. L	Melrose	Hastings	"
256. Boutellier, F. P	Belle River	Essex	"
257. Longmuir, John	St. Ola	Hastings	"
258 Bogle, John F	Strabane	Wentworth	"
259. Matheson, Wm	Donegal	Perth	"
260. Askin, Thos	Alfordford	Bruce	"
261. Miller, Andrew	Wroxeter	Huron	"
262. Boyd, Wm	Hepetown	Lanark	"
263. Whales, Mrs. Alice	Sotia	Parry Sound	"
264. Burke, Wm., Jr	Purple Valley	Bruce	"
265. Speiran, John	Henfryn	Huron	Peas.
266. Windatt, John D	Gamebridge	Ontario	"
267. Fell, Wm	Orilia	Simcoe	"
268. Eastwood, John	Tarbert	Dufferin	"

LIST OF EXPERIMENTERS.—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
269. Servos, A. D. K.	Niagara	Lincoln	Peas.
270. Stroh, G. R.	Conestoga	Waterloo	"
271 Byers, Thos.	Williamsford	Grey	"
272. Hutt, F. A.	South End	Welland	"
273. Moffatt, J. S.	Bognor	Grey	"
274. McNee, Arch.	Ennotville	Wellington	"
275. O'Connor, Jas	Renfrew	Renfrew	"
276. Kidd, C.	Cookstown	Simcoe	"
277. Fraser, W. R.	Bluevale	Huron	"
278. Swain, W. R.	Valentia	Victoria	"
279. Grady, Jas W.	Annan	Grey	"
280. Feeley, Thos.	Eganville	Renfrew	"
281. Burkholder, P. C.	Tapleytown	Wentworth	"
282. Robinson, John	Hepworth Station	Bruce	"
283. Turnbull, Edward B.	Brewster	Huron	"
284. Pugh, Jos. D.	Milverton	Perth	"
285. Isaac, Jas.	Dromore	Grey	"
286. Atkinson, D. S.	Boston Mills	Peel	"
287. Scott, Robt.	Malvern	York	"
288. Brown, D. A.	Lobo	Middlesex	"
289. Bewester, O. L.	Horning's Mills	Dufferin	"
290. Tracey, S. S.	Grenfel	Simcoe	"
291. Stoneman, Wm. J.	Maple Lake	Parry Sound	"
292. Clare, G. H.	Chapman	Hastings	"
293. Bradley, Miles	Restoule	Parry Sound	"
294. Misener, C. C.	Darling Road	Haldimand	"
295 Gorrell, G. H	Gore Bay	Manitoulin	"
296. Gilmour, Matthew	Doe Lake	Parry Sound	"
297. Reat, J. M.	Greenbank	Ontario	"
298. Warren, W. J.	Pembroke	Renfrew	"
299. Kitchen, E. W.	Lovering	Simcoe	"
300. Grant, W. M	Woodville	Victoria	"
301. Gadd, Thos.	Varney	Grey	"
302. Hulbig, John	Minden	Haliburton	"
303. Stephenson, J. N.	Ingersoll	Oxford	"
304. Clark, J. W.	Onondaga	Brant	"
305 Duncan, Geo. S.	Cayuga	Haldimand	"
306. Wilson, J. F.	Walmer	Oxford	"
307. Hunter, John	Wyoming	Lambton	"
308. Peskett, F. L.	Owen Sound	Grey	"
309. Craven, W. J.	Shelburne	Dufferin	"
310. Craven, M. A.	"	"	"
311. Brooks, R. A	North Port	Prince Edward	"
312. Lormie, A. B.	Otland	Northumberland	"
313. Munro, John	Clifford	Huron	"
314. Graeby, Harry	Durham	Grey	"
315. Finley, Walter	Novar	Muskoka	"
316. Stacey, Thos.	Bluevale	Huron	"
317. Reid, R. H	Reaboro	Victoria	"
318. Paterson, Robt.	Belton	Middlesex	"
319 Wilson, Chas.	Snelgrove	Peel	"
320. Kehoe, John	Coventry	"	"
321. Forsyth, Asa	Uxbridge	Ontario	"
322. Howell, T F.	Brantford	Brant	"
323 Drummond, Jackson	Connor	Simcoe	"
324. Eriskine, Thos.	West Lorne	Elgin	"
325. Nattel, C. J. S.	Goderich	Huron	"
326 McDermid, P. H	Martintown	Stormont	"
327. Warren, W. R.	Gamebridge	Ontario	"
328 Allen, Daniel	Cheltley	Bruce	"
329. Peter, Harold	Atwood	Perth	"
330 Miller, Jas. S.	Parry Harbor	Parry Sound	"
331. Beckett, Geo. W.	Effingham	Welland	"
332 McDermid, H. R	Martintown	Stormont	"
333. McVety, Wm.	Seaforth	Huron	"
334 Miller, Jas.	Vallentyne	Ontario	"
335. Martin, R. B.	Elmira	Waterloo	"
336. Regan, M.	Crathie	Middlesex	"

LIST OF EXPERIMENTERS —*Continued.*

Experimenter.	Post Office.	County.	Experiment.
337. Fischer, A. H	Molesworth	Perth	Peas.
338. Alexander, Jas.	Milton	Halton	"
339. Brown, Thos. T.	Thistletown	York	"
340. Hines, Wm. H.	Ashworth	Muskoka	"
341. Richardson, Robt.	Wyoming	Lambton	"
342. Osborn, J. H	Utterson	Muskoka	"
343. Watson, John	Port Perry	Ontario	"
344. Broom, John	Forrester's Falls	Renfrew	"
345. Jones, Isaac	Broadbent	Ontario	"
346. Hawkins, Wm., sr.	Alton	Peel	"
347. Siegner, E.	Mildmay	Bruce	"
348. Partridge, J. W.	Crown Hill	Simcoe	"
349. Strachan, Thos.	Brussels	Huron	"
350. Cullis, Fred.	Vandeleur	Grey	"
351. Crawford, D. S.	Purple Valley	Bruce	"
352. Trachsell, S. M.	Shakespeare	Perth	"
353. McMurchy, John	Erie	Norfolk	"
354. O. A. C.	Guelph	Wellington	"
355. Greaves, John E.	Dromore	Grey	Beans.
356. Robins, Allen	Boyle	Monck	"
357. Westney, Stephen	Pickering	Ontario	"
358. White, Clement	Colinville	Lambton	"
359. Jull, J. R.	Mt Vernon	Brant	"
360. Doud, F. B.	Branchton	"	Japanese beans.
361. Miller, Simon	Unionville	York	"
362. Neilson, Jno. D.	Thedford	Lambton	"
363. O. A. C.	Guelph	Wellington	"
364. Trimble, T. B.	Tapleytown	Wentworth	Carrots.
365. Brennan, E. A.	Orillia	Simcoe	"
366. Shelly, E. A.	Colgan	"	"
367. Robson, Alfred	Norwood	Peterboro	"
368. Hundt, John A.	Carlsruhe	Bruce	"
369. Dodge, Wm.	Uttoxeter	Lambton	"
370. Tinney, J. D	Oakwood	Victoria	"
371. Phippen, Francis	Port Sydney	Muskoka	"
372. Matheson, N. E.	Donegal	Perth	"
373. Barrett, Chas. E.	Marsville	Dufferin	"
374. Powell, H. O.	Brockville	Leeds	"
375. Hodge, G. T.	Stanleydale	Muskoka	"
376. McBride, John	Mono Mills	Dufferin	"
377. Binnie, Geo.	Bunessan	Grey	"
378. Smith, J	Ridgeway	Welland	Mangels and sugar beets.
379. McCullough, H. A.	Nantyre	Simcoe	"
380. Young, John	Waubuno	Lambton	"
381. Cross, J.	Caledonia Springs	Prescott	"
382. Little, Joseph	Fairholme	Parry Sound	"
383. Hull, G. S.	Kerwood	Middlesex	"
384. Lunn, Thomas	Burtch	Brant	"
385. Shearer, Charles E.	Vittoria	Norfolk	"
386. Leak, E. G.	Woodslee	Essex	"
387. Julian, Geo	Heathcote	Grey	"
388. Hamilton, Miller	Athlone	Simcoe	"
389. Hildreth, Samuel	Tapleytown	Wentworth	"
390. Robertson, James	Apto	Simcoe	"
391. Downey, Orland	Castlederg	Peel	"
392. Turnbull, Robert	Brewster	Huron	"
393. Gatecliffe, Geo.	Oil Springs	Lambton	"
394. Wilson, Thos	Gore Bay	Algoma	"
395. Kidd, John	Stafford	Renfrew	"
396. Taylor, Thos. P.	Burford	Brant	"
397. Dunn, J. A.	Wooler	Northumberland	"
398. McCreath, Mat	Kincardine	Bruce	"
399. Sutherland, Herbert	Strathroy	Middlesex	"
400. Scissons, Thomas	Dunrobin	Carleton	"
401. Campbell, P. M.	Balderson	Lanark	"
402. Farmer, W. E.	Lake Talon	Nipissing	"
403. Belleby, Martin	Camperdown	Grey	"
404. Carmody, Wm.	Siloam	Ontario	"

LIST OF EXPERIMENTERS. — *Continued.*

Experimenter.	Post Office.	County.	Experiment.
405. Martin, Joseph	Amherstburg	Essex	Mangels and sugar beets.
406. Mark, Leslie	Oakwood	Victoria	"
407. Knox, W. A.	Belgrave	Huron	"
408. Falkingham, Wm.	Edge Hill	Grey	"
409. Mooney, Wm.	Paisley	Bruce	"
410. O. A. C.	Guelph	Wellington	"
411. Poff, John	Greenview	Hastings	"
412. Hallman, Josiah.	Washington	Waterloo	Turnips.
413. E. A. B. Proctor	Bunyan	Lambton	"
414. A. W. Westgate	Watford	"	"
415. O. A. C.	Guelph	Wellington	"
416. Dickin, John	Milton	Halton	Injury done by weevils.
417. Scarf, Thos	Rocky Saugeen	Ontario	"
418. O. A. C.	Guelph	Wellington	"
419. Blazer, E	Rye	Parry Sound	Preparation of seed potatoes.
420. Irving, J. C.	Cherry Valley	Prince Edward	"
421. Proudfoot, James	Fenaghvale	Prescott	"
422. Stephens, Thos. W.	Aurora	York	"
423. Wright, John H	Stewartville	Renfrew	"
424. Scarf, Wm	Aberdeen	Grey	"
425. Haid, Nicholas	Hesson	Perth	"
426. Haines, Wm. F.	Parry Sound	Parry Sound	"
427. Shepherd, Frank	Pickering	Ontario	"
428. Adolph, Louis	Wallace	Perth	"
429. Wilson, John	Utterson	Muskoka	"
430. Pegg, James	Kolapore	Grey	"
431. Jacobs, Henry	Parkersville	Muskoka	"
432. Stevenson, E. H.	Renfrew	Renfrew	"
433. Thomas, C. E.	Novar	Muskoka	"
434. Kilfoyle, Milton	Mud Creek	Lanark	"
435. Weir, Alex. S	Utterson	Muskoka	"
436. McBain, J. W.	Atwood	Perth	"
437. Woods, Michael	Woodington	Simcoe	"
438. Patton, Chas, Jr	Heckston	Dundas	"
439. Davison, Wm. H	Paisley	Bruce	"
440. Smith, James	Edgar	Simcoe	"
441. Middleton, Chas.	Mount Hope	Bruce	"
442. Compton, Geo.	Aspdin	Muskoka	"
443. Heaven, Claude C.	Oakville	Halton	"
444. Harsett, P. B	Mt. Forest	Grey	"
445. McLeod, Andrew	Napanee	Lennox	"
446. Creighton, J. C	Hawley	"	"
447. Rock, James	Hutchinson	Middlesex	"
448. McFayden, John H.	Durham	Grey	"
449. McColl, Arch.	Aldboro	Elgin	"
450. Kirk, Geo. H.	Codrington	Northumberland	"
451. Scott, Richard	Powassan	Parry Sound	"
452. Moir, James	Sundridge	"	"
453. Tinney, John D.	Oakwood	Victoria	"
454. Atkinson, F. W.	Strathroy	Middlesex	"
455. Colwell, Samuel	Carholme	Norfolk	"
456. McPherson, G. L	Puslinch	Wellington	"
457. Butcher, S. J.	St. Catharines	Lincoln	"
458. Bell, J F.	Leamington	Essex	"
459. Oke, W. J.	Hay	Huron	"
460. Dolrymple, Alex.	Dunnville	Haldimand	"
461. Eask, W	Sutton West	York	"
462. Cundish, Albert	Sombra	Lambton	"
463. Hutchinson, J. H.	Gooderham	Peterboro	"
464. Brodie, J. F.	Pt. Cockburn	Parry Sound	"
465. Duncan, Alex.	Springbank	Middlesex	"
466. Cooper, Chas	Atterc iff	Haldimand	"
467. Grierson, James	Toronto	York	"
468. Barber, T. E	Rossmore	Prince Edward	"
469. Brown, Ed	Huntsville	Muskoka	"
470. Patterson, Walter S.	Belton	Middlesex	"
471. Shields, W. M	O'Connell	Ontario	"
472. Patton, Thomas G.	Oakville	Halton	"

LIST OF EXPERIMENTERS — *Continued.*

Experimenter.	Post Office.	County.	Experiment.
473. Stewart, A	Ailsa Craig	Middlesex	Preparation of seed potatoes.
474. Parkinson, Wesley	Elimville	Huron	"
475. Irvine, Wm	Habermehl	Grey	"
476. Turner, Wm H	Ridgetown	Kent	"
477. Brenton, Joe	Corbyville	Hastings	"
478. Revel, Geo	Orillia	Simcoe	"
479. Henry, John	Sylvan Valley	Algoma	"
480. O'Connor, P. H	Fingal	Elgin	"
481. Clapp, W. S	Rose Hall	Prince Edward	"
482. Brown, D. M	Strathroy	Middlesex	"
483. Stokes, Wm. R	Sombra	Lambton	"
484. Hymess, Geo. E	Beaver Mines	Algoma	"
485. Rose, James B	Black Heath	Wentworth	"
486 Adams, Dudley	Cardinal	Grenville	"
487. Haid, Edward	Hesson	Perth	"
488 Mackie, Jas	Mt. Dennis	York	"
489. Russell, W. H	Essex	Essex	"
490. Jackson, W. J	Playfair	Lanark	"
491. Hoar, Wm	Myrtle	Ontario	"
492. Meads, Edward	Axe Lake	Parry Sound	"
493. Wadsworth, Albert	White Bread	Lambton	"
494. Vining, Ebenezer	Thorndale	Middlesex	"
495. Hicks, Henry M	Lochlin	Haliburton	"
496. Sheil, John J	Ariel	Parry Sound	"
497. Kerfoot, John J	Musing	Simcoe	"
498. Gilmour, David	Hampden	Grey	"
499. Knight, Thos. W	Brackenrig	Muskoka	"
500. Gale, F	Lake Talon	Nipissing	"
501. Shuh, Frank	Waterloo	Waterloo	"
502. Pearce, W. H	Newcastle	Durham	"
503. Alton, G. W	Houghton Centre	Norfolk	"
504. Bray, Daniel	Huntsville	Muskoka	"
505. Ridler, T	Fort William	Algoma	"
506. Stroh, W. R	Conestoga	Waterloo	"
507. Hubbard, J. S	Ravenscliff	Muskoka	"
508. Kincaid, Peter	Peabody	Grey	"
509. Pearson, P. W	Aurora	York	"
510. Abbott, Francis G	Lucan	Middlesex	"
511. Willsie, Jacob	Thedford	Lambton	"
512. Skinner, Thomas	Croton	Kent	"
513. Schuter, M	Chepstow	Bruce	"
514 Fisher Bros	South Middleton	Norfolk	"
515. Graham, David	Sutton West	York	"
516. Henderson, John	The Ridge	Hastings	"
517. Taylor, A. J	Glencoe	Middlesex	"
518. Hamilton, Robert N	Russell	Russell	"
519. Cragg, Thos. H	Croton	Kent	"
520. James, G. M	Waterford	Norfolk	"
521. Kitchen, Jos	Huntsville	Muskoka	"
522 Adams, W. J	Dromore	Grey	"
523. Brown, Alfred	McLean	Frontenac	"
524. Blyth, G. J	Chatsworth	Grey	"
525. Anderson, A. D	Keene	Peterboro	"
526 Krick, G. E	Elcho	Muck	"
527. London, J. B	Lansdowne	Leeds	"
528. King, N	Marsville	Dufferin	"
529. Smailes, John	Eagle	Elgin	"
530. Gale, W. T	Lake Talon	Nipi-sing	"
531. Simpson, Wm	Ridgetown	Kent	"
532 Whitside, T	Corbett	Huron	"
533. Hughson, Richard	Dresden	Kent	"
534. Dunn, James	Sundridge	Parry Sound	"
535 Wells, Peter	Jura	Lambton	"
536. Rae, Alex	Invermay	Bruce	"
537. Shirreff, Benjamin	Allenford	"	"
538. Beatty, David	Chapman	Hastings	"
539. Shannon, M	Centreville	Arding on	"
540. Hilborn, Howard	Bosworth	Wellington	"

LIST OF EXPERIMENTERS.—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
541. Scoffin, W. J	Uttoxeter	Lambton	Preparation of seed potatoes.
542. McKinnon, D. C	Fawn	Ontario	"
543. Munger, A. T.	Hallow	Essex	"
544. Huffman, W. G.	Gilead	Hastings	"
545. Scott, R. B	Seaforth	Huron	"
546. Manson, J. A.	Blake	"	"
547. Salisbury, Sam. N.	Moira	Hastings	"
548. Eggleafield, L. W.	Sault Ste. Marie	Algoma	"
549. Jinkinson, S. A	Ashton	Carleton	"
550. Knight, Thos., Jr.	Rodney	Elgin	"
551. Madden, Alex	North Williamsburg.	Dundas	"
552. Steele, Abel.	Ferguson	Middlesex	"
553. Challis W. J.	Thamesville	Kent	"
554. Cahoon, Nelson	Picton	Prince Edward	"
555. Haight, Carniff	Bloomfield	"	"
556. Marjerrison, Wm	Apple Hill	Glengarry	"
557. Moulding, R. J.	Sundridge	Parry Sound	"
558. Werry, H. J.	Enniskillen	Durham	"
559. Firth, John.	Edge Hill	Grey	"
560. Hodge, Percy.	Stanleydale	Muskoka	"
561. Armstrong, W. E.	"	"	"
562. Hewton, Wm.	Hope Bay	Bruce	"
563. Dick, Roland.	Mabee	Norfolk	"
564. Black, J. F.	Gleneden	Grey	"
565. Hill, John H	Woodstock	Oxford	"
566. Kitson, John T	Stayner	Simcoe	"
567. McNair, J. D.	Cranbrook	Huron	"
568. Carter, Jas	Athol	Glengarry	"
569. Inkster, Wm. F	Wareham	Grey	"
570. Williams, John	Shelburn	Dufferin	"
571. Greenaway, Allie	Cambray	Victoria	"
572. Hall, Johnston	Keady	Grey	"
573. File, C. E	Napanee	Lennox	"
574. Lawson, Jas. T	Kearney	Parry Sound	"
575. Marquis, Wesley	Holmesville	Huron	"
576. Young, John	Chepstow	Ontario	"
577. Clarridge, H. C	Brampton	Peel	"
578. Cochrane, Wm	Brussels	Huron	"
579. Shiells, Peter	Amberly	"	"
580. Whetter, F. A	Lorneville	Victoria	"
581. Whetter, J. R	"	"	"
582. Weage, W. R	Albury	Prince Edward	"
583. Stevens, J. H	Bartonville	Wentworth	"
584. Keppy, Wm	Spence	Parry Sound	"
585. Swan, Geo	Stanleydale	Muskoka	"
586. Drummond, Geo. A.	Connor	Simcoe	"
587. Burnham, L. V	Sombra	Lambton	"
588. Swan, J. H.	Stanleydale	Muskoka	"
589. Dunnell, Jno	Bayview	Grey	"
590. Russell, Jas. W.	Blairton	Peterboro	"
591. Macphee, Hugh	Crewe	Huron	"
592. Armstrong, Jno.	Avonmore	Stormont	"
593. Dorland, A. M	Bloomfield	Prince Edward	"
594. Filson, Henry	Stella	Lennox	"
595. Richardson, Howard	Huntley	Carleton	"
596. Markley, Wm	Irena	Dundas	"
597. Wilson, Jas	Peterboro	Peterboro	"
598. Arnold, F	Kent Bridge	Kent	"
599. Orser, W. H.	Wilberforce	Haliburton	"
600. Munro, Angus, Sr.	Powassan	Parry Sound	"
601. McLeod, D. A	Brooksdale	Oxford	"
602. Forrester, John	Port Elgin	Bruce	"
603 Keefer, J. G	Norwood	Peterboro	"
604. Ritchie, Alex.	Inverary	Frontenac	"
605. Cubbon, H	Kinmount	Victoria	"
606. Dale, Richard B.	Chatham	Kent	"
607. Davis, Farwell.	Foxboro	Hastings	"
608. Baxter, J.	St. Paul's	Perth	"

LIST OF EXPERIMENTERS—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
609. Sebber, Geo	Ingersoll	Oxford	Preparation of seed potatoes.
610. Neil, J. F	West McGillivray	Middlesex	"
611. Marshall, Dan	Allenford	Grey	"
612. Remmer, Enos	Pickering	Ontario	"
613. Sproull, Thos	Dayton	Algoma	"
614. McLean, L	Watford	Lambton	"
615. Menzies, Jas. B	Molesworth	Huron	"
616. Smyth. J. P	Huntsville	Muskoka	"
617. Bray, W. H	"	"	"
618. Smith, W. B	Fruitland	Wentworth	"
619. Hill, Geo. & Son	Port Hope	Durham	"
620. McAsh, John	Varna	Huron	"
621. Preston, J J	Oliphant	Bruce	"
622. Lidgett, Edward	Kinsale	Ontario	"
623. McKellar, A	Kertch	Lambton	"
624. Westington, W. J	Plainville	Northumberland	"
625. Benson, John J	Brookholm	Grey	"
626. Wilson, John	Utterson	Muskoka	"
627. Hubbert, Jas	Allandale	Simcoe	"
628. Watson, T. H	Sonya	Victoria	"
629. Calvert, A. E	Mandaumin	Lambton	"
630. Ferrill, Wm	Albury	Prince Edward	"
631. Thomas, F. A	Novar	Muskoka	"
632. Sollitt, W. S	Uxbridge	Ontario	"
633. Graham, J. A	Moonstone	Simcoe	"
634. Roulston, W. D	Garnet	Norfolk	"
635. Quinn, Andrew	Listowel	Perth	"
636. Sutherland, A. B	Medina	Oxford	"
637. Otis, W	Springford	"	Hilled and drilled corn.
638. Traviss, Herbert	Queensville	York	"
639. Smith, H. F	Iroquois	Dundas	"
640. Brown, Wm	Morley	Grey	"
641. Smith, Jas. E	Iroquois	Dundas	"
642. McKenney, Hugh	Corinth	Elgin	"
643. Richard, G. F	Ravenscliff	Muskoka	"
644. Way, W. J	Merlin	Kent	"
645. Davis, W. J	Saintsbury	Middlesex	"
646. O. A. C	Guelph	Wellington	"
647. Shantz, A	Waterloo	Waterloo	Potatoes.
648. Whiteside, A. E	O. A. C., Guelph	Wellington	"
649. Dean, H H	"	"	"
650. McCrimmon, J. R	Vankleek Hill	Prescott	"
651. Goble, F. W	Woodstock	Oxford	"
652. Ross, H. R	Gilead	Hastings	"
653 Forbes, C. W	Jeanette's Creek	Kent	"
654. Pickett, B	Vittoria	Norfolk	"
655. Raynor, T. G	Rose Hall	Prince Edward	"
656. Dolson, W. J	Chatham	Kent	"
657. Silcox, F. H	Iona	Elgin	"
658. Ross, D. A	Martintown	Glengarry	"
659. Wilson, Jas	Whitechurch	Bruce	"
660. Black, W. J	Stanton	Dufferin	"
661. Humphrey, Geo	Troy	Wentworth	"
662. Campbell, J. A	Simcoe	Norfolk	"
663. Lick, Elmer	Oshawa	Ontario	"
664. Putnam, G. A	O. A. C., Guelph	Wellington	"
665. O. A. C	Guelph	"	"
666. Naftel, C. J. F	Goderich	Huron	Winter wheat, set 1.
667. High, A L	Jordan	Lincoln	"
668. Osborne, Jos	Wyoming	Lambton	"
669. Night, Chas. H	Cranbrook	Huron	"
670. Russell, W. W	Uhthoff	Simcoe	"
671. Brown, Simeon	Rosedene	Lincoln	"
672. Gray, Alexander	Marksville	Algoma	"
673. Querengener, Chas	Broadhagen	Perth	"
674. Allen, Daniel	Chesley	Bruce	"
675. Moses, George	Avonton	Perth	"
676. Shannon, Fred	Elsinore	Bruce	"

List of Experimenters—*Continued.*

Experimenter.	Post Office.	County.	Experiment.
677. Loucks, Gordon	Minden	Haliburton	Winter wheat, set 2.
678. McKay, Alex	Middleville	Lanark	"
679. Dickson, Andrew	Drumbo	Oxford	"
680. Moore, Quinten	Bobcaygeon	Peterboro	"
681. Callaghan, Jas	Reaboro	Victoria	"
682. Trachsel, Gilgian	Shakespeare	Perth	"
683. Bailey, Wm. H	Torrance	Simcoe	"
684. McDonald, R	Wiarton	Grey	"
685. Carrol, Jno	Joynt	Wright, P. Q	"
686. Jones, Richard	Elimville	Huron	"
687. Wrathell, F	Harper	Lanark	"
688. Atkinson, Dean	Boston Mills	Peel	"
689. O. A. C	Guelph	Wellington	"
690. Hulbig, John	Minden	Haliburton	"
691. McKenner, Timothy	Dornoch	Grey	"
692. Wagg, G. C	Stouffville	York	"
693. McKenzie, D	Kincardine	Bruce	"
694. Shultz, H. A	Clontarf	Renfrew	"
695. Lamb, J. T	Walkerton	Bruce	"
696. Horner, Franklin	Mimico	York	"
697. Walker, J. E	Kinmount	Haliburton	"
698. Nisbett, H. G	Lakehurst	Peterboro	"
699. Rolufs, R. M	Mount Eorest	Grey	"
700. Waddell, A, J	North Osgoode	Carleton	"
701. Alexander, George	Allen Park	Grey	"
702. Hill, Wm	Clifford	Bruce	"
703 Gray, Daniel	Marksville	Algoma	"
704. Storry, Levi	Wareham	Grey	"
705. Bacon, Wm	Orillia	Simcoe	"
706. Ion, Arthur	Barwick	Ontario	"
707. Brent, Jos	Adelaide	Middlesex	"
708 Flint, Arthur	Cottam	Essex	"
709. Koehler, Louis	Waterloo	Waterloo	"
710. Williams, W. E	Clandeboye	Middlesex	"
711. Eaton, Thos	Byng	Haldimand	"
712. Johnson, Joshua	Trowbridge	Perth	"
713. Porterfield, Jas	"	"	"
714. Letherland, Robert	Seaforth	Huron	"
715. Brodie, James	Vandeleur	Grey	"
716. Moore, Wm	Bobcaygeon	Peterboro	"
717. Tompkins, Levi	Dundonald	Northumberland	"
718. Smith, Archie	Southcote	Wentworth	"
719. Wells, E	Canning	Oxford	"
720. Middleton, Chas	Mount Hope	Bruce	"
721. Curry, I	Echo Bay	Algoma	"
722. Wilkinson, G. W	"	"	"
723. O. A. C	Guelph	Wellington	"
724. McLean, Alex	Peabody	Grey	Winter wheat, set 3.
725. Triebner, Frank	Exeter	Huron	"
726. Wood, Alex	Villiers	Peterboro	"
727. Wheatley, Thos	Clarksburg	Grey	"
728. Anderson, Geo. B	Medina	Oxford	"
729. Carmichael, Duncan	West Lorne	Elgin	"
730. Davis, C. G	Truman	Halton	"
731. Moore, Jas	Greenock	Bruce	"
732. Kerr, Russell	Clavering	Grey	"
733, Hord, Jas	Ilderton	Middlesex	"
734. Blight, John	The Grove	"	"
735. Ramage, Wm	Dromore	Grey	"
736. Keffer, Jas. H	Sherwood	York	"
737. O. A. C	Guelph	Wellington	"

REPORTS OF EXPERIMENTS.

The instructions for conducting each experiment as well as the summary results of each successfully conducted test and the conclusions therefrom are here presented.

No. 1—Testing Nitrate of Soda, Superphosphate, Muriate of Potash, Mixture, and no Fertilizer with Corn.

1. Upon uniform land which has received no manure for at least four years, mark off five plots, each two rods long by one rod wide.
2. Mark out each plot into ten rows one way by five rows the other way, allowing 3 feet 4 inches between the rows.
3. Sow the different fertilizers as indicated by the labels on the packages.
4. Plant 6 kernels of the Salzer's North Dakota Corn at each of the places where the lines touch, and thus make fifty hills on each plot.
5. When the plants are about 4 inches tall, thin out to 4 plants per hill.
6. Cut the corn before it is injured by frost.
7. Weigh the whole crop from each plot as soon as cut, and then husk, weigh and count the ears, and examine the condition of the grain.

No. 2.—Testing Nitrate of Soda, Superphosphate, Muriate of Potash, Mixture and no Fertilizer with Mangels.

1. Upon uniform land which has received no manure for at least four years, mark off five plots, each two rods long by one rod wide
2. Leave a path 3 feet wide between each two plots.
3. Make 8 drills, 25 inches apart and 2 rods long in each plot.
4. Sow the different fertilizers as indicated by the labels on the packages.
5. Sow the Carter's Champion Yellow Intermediate Mangel seed as evenly as possible on the five plots.
6. Thin the young plants when about 3 inches tall to a distance of 10 inches apart in the drills, and leave 316 roots in each plot.
7. Again count the plants when about 8 inches tall, and, if necessary, remove a few of the plants from some plots in order that the number of roots on the different plots will be exactly the same.

Fertilizers.	Quantity of fertilizer used per acre.	Cost of fertilizers used per acre.	Average yield per acre.						
			Bushels of oats, 5 yrs., 74 tests.	Tons of mangels.		Tons of corn.			
				1899, 8 tests.	Average 3 years, 27 tests.	Total crop.		Ears.	
						1899, 8 tests.	Average 3 yrs., 31 tests.	1899, 8 tests.	Average 3 yrs., 26 tests.
	lbs.	$							
No fertilizer	.....	.....	38.90	23.98	19.54	8.52	7.29	1.91	3.16
Nitrate of Soda	160.0	3.52	46 30	26.85	24 32	9.70	8.40	2.35	3.54
Muriate of Potash.....	160.0	3.84	43.80	25.20	22.33	9.17	8.39	2.10	3.68
Superphosphate	320.0	3.36	43 60	25.83	22 62	9.51	8.12	2.38	3.65
Mixed fertilizer.....	213.3	3.57	48.70	24.68	22 84	9.65	8.40	2.17	3.72

For the five years, 1892, 1893, 1894, 1895 and 1896, co-operative experiments were conducted throughout Ontario by testing commercial fertilizers with oats, and in 1897, 1898 and 1899 by testing the same kinds and qualities of fertilizers with mangels and with corn. Both the fertilizers and the seed were weighed and done up separately and sent from the College to the experimenters during each of the eight years. Nitrate of Soda and Muriate of Potash were each used at the rate of 160 pounds per acre; superphosphate at the rate of 320 pounds per acre, and the complete fertilizer at the rate of $213\frac{1}{3}$ pounds per acre. The complete fertilizer was composed of Nitrate of Soda, Muriate of Potash, and Superphosphate, in the proportions of 1, 1, and 2 by weight. The Nitrate of Soda was applied when the plants were about two inches in height, and the Muriate of Potash and Superphosphate at the time of sowing the seed.

Conclusions.

1. The unfertilized land gave a less yield than the fertilized land in each of the years and with each of the three crops—oats, mangels and corn.

2. On some soils the application of fertilizers had but little influence, and on others it about doubled the yields of the crops.

3. The summary results from the application of the fertilizers show that the largest average yield was produced by sowing the complete fertilizer with oats; the nitrogenous fertilizer with mangels; and the potassic, nitrogenous, or complete fertilizer with corn.

4. The largest average increases in yields of crops per acre from using the fertilizers were as follows: 9.8 bushels of oats from sowing 213⅓ pounds per acre of the mixed fertilizer, costing $3.57, or 36.4 cents for each extra bushel produced; 1.1 tons of corn from sowing 160 pounds per acre of Muriate of Potash, 160 pounds of Nitrate of Soda, or 213⅓ pounds of Mixed Fertilizer, costing $3.84, $3.52, and $3.57 respectively, or $3.49, $3.20, or $3.25 for each extra ton produced; and 4.78 tons of mangels from sowing 160 pounds per acre of Nitrate of Soda, costing $3.52, or 73.6 cents for each extra ton produced.

No. 3.—Growing Three Leguminous Crops for Green Fodder.

1. Prepare for sowing all the packages of seeds upon three uniform plots, each plot being exactly two rods long by one rod wide.
2. Drive wooden stakes at the four corners of each plot and leave a clean path three feet wide between each two plots.
3. When the land becomes sufficiently warm in the spring, run a strong cord around each plot, and sow the different packages upon their respective plots and inside of the cord.
4. After the plants are up two or three inches, run a cord around each plot and cut off every plant outside of the cord.
5. The Grass Peas and the Tares should be cut as soon as the pods are one-half grown, and the green crop from each plot should be weighed immediately after being cut.
6. Feed the green crops separately to farm animals and take notice of which varieties are liked the best.

Varieties.	Length of plants, —inches.	Tons per acre. 5 tests.
Hairy Vetch	41	9.0
Common Vetch	29	6.9
Grass Peas	25	5.1

The Hairy Vetches, Common Vetches and Grass Peas are all leguminous crops and therefore, like clover and peas, are valuable as nitrogen gatherers. The seed of Hairy Vetches was brought from Russia to the United States in 1886. The crop is used for green fodder, for hay, or for plowing under as a green crop.

Conclusions.

1. Each of the three crops grown was fed to horses, cattle and sheep by the different experimenters and seemed to be generally relished.

2. The Grass Peas gave a larger average yield of green crop than the Common Tares in the co-operative experiments of 1898 and of 1897.

3. Crimson Clover, which was included in the experiment of 1897, and again in 1898, was discarded this season owing to the poor record which it made throughout the Province.

No. 4.—Testing Three Mixtures of Grain for Green Fodder.

1. Prepare for sowing the packages of seeds upon three uniform plots, each plot being exactly two rods long by one rod wide.
2. Drive wooden stakes at the four corners of each plot and leave a clean path three feet wide between each two plots.
3. Run a strong cord around each plot and sow the different packages upon their respective plots and inside of the cord.

4. After the peas are up two or three inches, again run the cord around each plot and cut off every plant outside of the cord.

5. The crops should be cut as soon as the heads are well out and the grain is in the milk stage, and immediately weighed in the green condition.

Mixtures.	Comparative value by experimenters, 4 years.	Yield per acre.—tons.	
		1899. 3 tests.	Average 4 years. 23 tests.
Oats, 1½ bushels per acre Peas, ½ bushel " Tares, ½ " "	85	6.97	8.72
Oats, 1½ bushels " Peas, 1 bushel "	100	6.10	8.20
Oats, 1½ bushels " Tares, 1 bushel "	76	6.94	7.89

For four years in succession, an experiment has been conducted throughout Ontario by using three mixtures of grain for the production of green fodder; oats and peas forming one mixture; oats and tares, another; and oats, peas and tares, the third. The Siberian Oats, Prussian Blue Peas and common tares or vetches were used for the experiments.

Conclusions.

1. Oats and peas produced the largest yield of green crop per acre in 1896 and in 1898; and oats, peas and tares, the largest yield in 1897 and in 1899.

2. Oats and peas formed the most popular mixture for green fodder in the experiments of 1896, 1897, 1898 and 1899.

3. Either oats and peas, or oats, peas and tares, mixed in the proportions as used in this experiment, produces a good crop to use for green fodder.

No. 5—Testing Six Leading Varieties of Corn.

1. Prepare for sowing all the varieties upon six uniform plots, each plot being exactly 1 rod (16½ feet wide by 2 rods (33 feet) long.

2. Mark out each plot into five rows one way by ten rows the other way, allowing 3 feet 4 inches between the rows.

3. Plant each variety of corn upon its respective plot. Drop six kernels at each of the places where the lines touch, and thus make fifty hills of each variety.

4. When the corn is about 4 inches high, thin out to four plants per hill.

5. Cut each variety before frost, and at the time when its stage of growth corresponds to the roasting condition of field corn, or when the grain is partly glazed. Weigh the whole crop from each plot as soon as cut, and then husk, weigh, and count the ears, and examine the condition of the grain.

Varieties.	Average condition of grain at time of cutting.	Height of Crop, (ins.)	Yield per acre—tons.	
			Ears, 7 tests.	Whole Crop, 12 tests.
Mammoth Cuban, Yellow Dent	Dough (74)	106	2.8	14.3
Mastadon, Yellow Dent	Firm Dough (82)	101	2.8	13.5
Wisconsin Earliest, White Dent	Dough (74)	94	2.8	12.0
Salzer's North Dakota, White Flint	Ripe (100)	89	2.6	11.2
King Philip, Reddish Flint	Ripe (100)	84	2.7	10.0
Stowell's Evergreen, Sweet	Dough (70)	82	2.5	10.0

The varieties of corn sent out for co-operative experiments in 1899 include some of the best of the large, the medium, and the small varieties, and represented the dent, the flint, and the sweet classes.

Conclusions.

1. In the co-operative experiments over Ontario in 1899 the Mammoth Cuban and Mastadon Dent appeared to be adapted to the conditions of Southern Ontario, the Wisconsin Earliest White Dent to Southern and Central Ontario, and the Salzer's North Dakota and the King Philip to Central and Northern Ontario.

2. That variety of corn which will produce the largest total yield per acre and the largest yield of grain per acre among the varieties that will mature in any locality before the leaves become frozen is one of the best corns for that locality.

3. The three varieties of dent corn gave the heaviest yield of green corn per acre, and the one variety of sweet gave the lowest yield ; the two varieties of flint corn holding an intermediate position in yield of whole crop.

4. Each of the two varieties of flint corn was earlier in reaching maturity than any of the dent varieties.

5. The individual experiments show that no one variety of corn is well suited to all parts of Ontario.

No. 6—Testing Four Leading Varieties of Millet.

1. Upon soil prepared as for corn, sow all the varieties upon four uniform plots, each two rods long by one rod wide.

2. Drive wooden stakes at the four corners of each plot and leave a clean path three feet wide between each two plots.

3. Run a strong cord around each plot and sow the different varieties upon their respective plots and inside of the cord. Aim at seeding one inch deep.

4. After the plants are up 2 or 3 inches, again run the cord around each plot and cut off every plant outside of the cord.

5. The crops should be cut as soon as the heads are in appearance, and immediately weighed in the green condition.

Varieties.	Estimated Value 2 years.	Tons per acre—green hay.	
		1899 5 tests.	2 years 10 tests.
Japanese Panicle	100	4.4	6.4
Japanese Barnyard	72	3.7	5.9
Hungarian Grass	62	4.0	4.8

There were four tests with millet in 1892, two in 1892, two in 1893, five in 1894, five in 1895, and four in 1896. The average results from the five years showed that the Salzer's Dakota gave 7.7 tons, Golden Wonder 6.5 tons, and the Common millet 5.2 tons per acre. Three varieties of Japanese millet have been introduced more recently and they have made high records at the College. Two of these Japanese millets and the Hungarian grass have now been under comparative tests over Ontario in each of the past two years.

Conclusions.

1. For two years in succession, the Japanese Panicle millet has given a larger yield of crop per acre than either of the other two varieties of millet under test.

2. The Japanese Panicle variety of millet was a favorite with the experimenters in each of the past two years.

3. The Hungarian grass gave an average of 1.6 tons of crop per acre less than the Japanese Panicle millet in the average of two years' experiments over Ontario.

No. 7.—Testing Four Varieties of Grasses for Hay.

1. Measure off four uniform plots, each one rod square, in a position that they may remain undisturbed for a number of years.
2. Drive wooden stakes at the four corners of each plot and have a clean path three feet wide between each two plots.
3. Run a strong cord around each plot and sow the different varieties upon their respective plots and inside of the cord.
4. Sow one half pound of some kind of spring grain on each plot at the same time that the other seeds are sown, and then rake the ground well.
5. After the grain is up four inches again run the cord around each plot, and cut off every plant outside of the cord.
6. Cut the grain when ripe, and remove it from the plots at once.
7. Again run a cord around each plot, and trim off the edges of the plot as evenly as possible.
8. Any weeds growing in the plots should be pulled out by hand or cut out by the spud.

Varieties.	Height 1st season, 3 years, (inches).	Tons of hay per acre.	
		2nd season, 2 years. 6 tests.	3rd season, 1 year. 2 tests.
Tall oat grass	11.8	3.0	2.3
Timothy	6.3	2.7	2.1
Orchard grass	10.8	2.0	1.6
Meadow Fescue	10.2	2.2	1.3

No farm crop grown in Ontario occupies a larger area of land than that used for the production of the grasses and clovers. A large amount of experimental work has been carried on at the College in testing the various kinds of grasses which have been obtained in Ontario and elsewhere. In 1897, four varieties were carefully selected from all those that had been grown at the College, and these were forwarded to those persons who wished to test them on their own farms. In each of the past two years the same varieties of grasses were again sent out. Each experimenter was asked to have his plots so located that he could leave them undisturbed for several years. We hope, therefore, to obtain some valuable information from these experiments after they have been conducted for a few years in succession.

Conclusions.

1. In the second year after seeding, each variety of grass produced an average of two tons or over of hay per acre; the tall oat grass giving the highest and the orchard grass the lowest yield.
2. The tall oat grass produced the greatest average height of crop in the first year, and the largest average yield of hay in both the second and the third years after seeding.
3. Of the four varieties under experiment, the tall oat grass produced the longest average length of plants in each of the first, second, and third years after seeding.

No. 8.—Testing Four Varieties of Clovers for Hay.

(For "Instructions," see experiment No. 7.)

Varieties.	Height 1st season, 3 years, (inches).	Tons per acre—2nd year.	
		Green hay. 6 tests.	Dry hay. 7 tests.
Mammoth Red	9.2	7.3	3.6
Common Red	7.3	6.0	2.4
Alsike	6.8	5.6	2.4
Lucerne	7.8	5.3	2.0

For three years in succession we have sent out seed of four varieties of clover for co-operative experiments. As with the grasses, the results for the first year after seeding are of but little value. The crop from the different varieties in the second year, however, supplies valuable date regarding the varieties under test. When the test is repeated for several years in succession, the accumulative results of the tests should supply information of considerable value.

Conclusions.

1. In average yield of hay per acre in the second year after seeding, each variety of clover gave two tons or upwards per acre; the Mammoth Red giving the highest and the Lucerne the lowest yield.

2. In the average of all the experiments with clover, the Mammoth Red produced the tallest growing crop in both the first and the second years after seeding.

3. The average yield of hay per acre from the four varieties of clover was forty-three per cent. as great as the average yield of freshly cut grass.

No. 9.—Testing Three Varieties of Buckwheat.

1. Prepare for sowing all the varieties upon three uniform plots, each plot being exactly one rod square
2. Drive wooden stakes at the four corners of each plot and leave a clean path three feet wide between each two plots.
3. Run a strong cord around each plot and sow the different varieties upon their respective plots and inside of the cord.
4. After the plants are up two or three inches, again run the cord around each plot and cut off every plant outside of the cord.
5. The crops should be cut as soon as they ripen, and when dry, weighed and threshed by flail immediately on being brought in from the heat of the sun, and then the grain should be weighed by itself.

Varieties.	Average height, 3 years.	Yield of grain per acre, (bushels).	
		1899. 1 test.	Average 3 years. 12 tests.
Japanese	33.2	24.2	23.3
Silver Hull	31.9	21.7	22.4
Common Grey	29.4	21.7	21.4

For three years in succession three varieties of buckwheat have been used for the co-operative experiments, and we now have the reports of twelve successfully conducted tests. There is not much interest taken in the growing of buckwheat in Ontario, as shown by the fact that there were about fourteen thousand acres less devoted to the crop in Ontario in 1899 as compared with that of 1898.

Conclusions.

1. In the co-operative experiments and in the experiments conducted at the College, the Japanese variety of buckwheat has given the largest, the Silver Hull variety the second largest, and the Common Grey variety the lowest yield of grain per acre.

2. There is a difference of about two bushels per acre between the average yield of the Japanese and of the Common Grey varieties of buckwheat throughout Ontario for the three years during which this experiment has been in progress.

3. The average yield of buckwheat per acre in the co-operative experiments for the past three years was as follows: 1897, 21.3 bushels; 1898, 16.5 bushels; and 1899, 22.5 bushels.

No. 10.—Testing Three Varieties of Spring Wheat and One of Spring Rye.

(For "Instructions," see experiment No. 9.)

Varieties.	Estimated value.	Yield per acre.	
		Straw. (tons). 31 tests.	Grain. (bushels). 43 tests.
Wellman Fife	100.0	1.7	23.5
Rio Grande	72.8	1.6	20.5
Herison Bearded	62.0	1.6	19.3
Spring Rye	41.3	1.3	19.0 (60 lbs.) / 21.4 (56 lbs.)

The demand for new varieties of spring wheat has been quite keen during the past five years, but previous to that period there was a gradual decline in the interest shown in this crop. In each of the past three years, spring rye was sent out along with the three varieties of spring wheat and the results of the experiments with the four crops are embodied in the one table. As the standard weight per measured bushels of spring wheat is 60 pounds and of spring rye is 56 pounds, we have reckoned the yield per acre of the rye by using both standards of weight for the convenience of comparing the results.

Conclusions.

1. The average yield of the spring wheat was considerably higher in the Union experiments for 1899 than in those of 1898, while the yield of the spring rye remained more constant.

2. The Herison Bearded variety of spring wheat gave the largest average yield of grain per acre in twenty nine co-operative experiments in 1893, nineteen in 1894, thirteen in 1895, and eighteen in 1896; and gave the second largest average yield of grain per acre in thirty-one co-operative experiments in 1897, and sixty-eight in 1898, but in 1899 it gave only the third largest average yield of grain per acre in forty-three tests.

3. In the co-operative experiments for 1899, the Wellman Fife variety of spring wheat possessed the stiffest and the spring wheat the weakest straw.

4. The spring rye and the Wellman Fife spring wheat produced straw with the least amount of rust and the Herison Bearded and the Rio Grande produced straw with the largest amount of rust in the Union tests of 1899.

5. The Wellman Fife variety of spring wheat has been grown at the Agricultural College for eight years in succession, and stands at the head of the list in average yield of grain per acre of the eight varieties which were grown in 1892 for the first time and have been tested each year since.

No. 11. Testing Four Leading Varieties of Barley.

(For "Instructions" see experiment No. 9.)

Varieties.	Estimated value.	Yield per acre.	
		Straw (tons) 41 tests.	Grain (bus.) 51 tests.
Oderbrucker	100.0	1.4	41.5
Mandscheuri	90.2	1.3	38.7
Success	60.1	1.1	34.2
Black Hulless	51.0	1.3	32.5 (48 lbs.) / 26.0 (50 lbs.)

For the barley experiment, four varieties were sent out, two of which were among the very best of the six-rowed class; one was a leader of the hulless class; and the other was one of the best representatives of the beardless class. As the standard weight per measured bushel of the barley in Ontario is forty-eight pounds, and as the hulless varieties usually weigh about 60 pounds per measured bushel, we reckoned the yield of the black hulless by using both weights per measured bushel. This will afford a better chance for comparing the different varieties one with the other.

Conclusions.

1. The Mandscheuri barley has given the largest average yield of grain per acre in the comparative test for each of the years 1892, 1893, 1894. 1895, 1896, 1897 and 1898, and the second largest average yield of grain per acre in 1899.

2. The Oderbrucker barley has given the second largest average yield of grain per acre in the conparative test for each of the years, 1892 1893, 1895, 1896, 1897 and 1898, and the largest average yield of grain per acre in 1899.

3 In 1899 the Oderbrucker and the Mandscheuri varieties of barley had the least rust and the Success and the Black Hulless the most rust in the experiments over Ontario.

4. In 1899 the Oderbrucker and the Mandscheuri varieties of barley possessed the stiffest and Black Hulless the weakest straw.

5. In the average results of tests made on fifty-one Ontario farms in 1899, the Success variety of barley was surpassed in yield of grain per acre by 7.3 bushel in the case of the Oderbrucker variety and 4.5 bushels per acre in the case of the Mandscheuri variety.

No 12. Testing Four Leading Varieties of Oats.

(For "Instructions" see experiment No. 9.)

Varieties.	Estimated value.	Yield per acre.	
		Straw (tons) 101 tests.	Grain (bus.) 117 tests.
Siberian	100.0	1 7	55.7
Bavarian	85 4	1.7	53.6
Joanette	62.9	1.5	51.8
Poland White	66.9	1.5	49.0

According to the report of the Bureau of Industries, the area devoted to the growing of oats in Ontario in 1899 was 2,363 778 acres. This is greater than the area given to any other crop in Ontario except to grasses and clovers. We have grown two hundred and eighteen varieties of oats at the Agricultural College within the past thirteen years in order to find out the most promising varieties. From this long list of varieties and from our extensive experimental work with this crop, we have been enabled to make an excellent selection for co-operative work throughout Ontario.

Conclusions.

1 The Siberian variety of oats occupied first place in yield of grain per acre in the average results of one hundred and twenty-five experiments in 1892, one hundred and five experiments in 1893, one hundred and twenty-one experiments in 1894, seventy-eight experiments in 1895, one hundred and six experiments in 1898, one hundred and seventeen experiments in 1899; and it occupied second place in this respect in 1896 and in 1897.

2 The Joanette occupied third place in yield of grain per acre in each of the years 1892, 1893, 1894, 1895 and 1899, and fourth place in each of the years 1896, 1897 and 1898

3 The Bavarian variety of oats, which stands second in yield per acre in the co-operative experiments in 1899, occupies the highest place in average yield of grain per acre among all the *Ontario* varieties grown at the experimental farm for ten years in succession.

4. The Siberian has the least and the Bavarian had the most rust of the four varieties in the experiments in 1899.

5. The Bavarian and the Siberian had the stiffest straw, and the Joanette the weakest straw in the Union experiments of the past year.

No. 13.—Testing Four Leading Varieties of Peas.

(For "Instructions," see experiment No. 9.)

Varieties.	Estimated value.	Yield per acre.	
		Straw (tons) 79 tests.	Grain (bushels) 90 tests.
Early Britain	96.4	1.2	28.1
Chancellor	94.2	1.3	27.5
Prussian Blue	100.0	1.5	27.2
Striped Wisconsin Blue	62.5	1.5	25.2

The Early Britain variety of peas was imported from England in 1899 and has made a high record as a yielder in the experiments at the College since that time. The peas are brown in color and the straw is shorter than in several of the other varieties.

The English seed firm under the name of Kamm & Co. addressed a letter, dated 30th November, 1898, to the curator of the Imperial Institute, London, England, in reference to Canadian peas. This letter was forwarded to the Ontario Department of Agriculture. From this letter I take the following extract: "We should recommend that the Canadian farmer should grow the so-called Wisconsin peas which is produced across his frontier in large quantities which give general satisfaction. We enclose type of this variety. It fetches a better price than the usual Canadian blue pea, and we could do with large quantities of it." In a letter sent from Mr. Mitchell, of the Canadian Government Agency at Liverpool, England, to the Hon. John Dryden, Toronto, we take the following: "I beg to suggest that experiments be made with the samples that are being sent, so that the attention of the Canadian Agriculturist may be directed to the advantages they may be found to possess. There is no doubt that English buyers would prefer to purchase Canadian produce rather than that from the United States of a similar article that can be exported from the Dominion"

We have grown the Wisconsin Blue pea in our experiments at Guelph during each of the past eight years and included it as one of the varieties for co-operative experiments over Ontario in 1899.

Conclusions.

1. The Early Britain has given the largest average yield of grain per acre in the co-operative experiments over Ontario in each of the past four years.

2 The Prussian Blue variety gave the largest average yield of grain per acre in the co-operative experiments in 1893 and in 1894; second largest in 1895 and 1897; third largest in 1898 and in 1899, and the fourth largest in 1896.

3. The Wisconsin Blue variety of peas gave a yield of grain of two bushels per acre less than the Prussian Blue variety, and about three bushels per acre less than the Early Britain variety.

4. The Prussian Blue was the most popular and the Wisconsin Blue was the least popular with the experimenters in 1899.

3 The average length of straw produced by the different varieties in 1899 was as follows: Prussian Blue, 50 inches; Wisconsin Blue, 48 inches; Chancellor, 42 inches, and Early Britain, 38 inches.

6 The Chancellor variety produced the best quality of straw and the Early Britain the poorest quality according to the reports of the experimenters.

No. 14.—Testing Three Varieties of Beans.

1. Prepare for sowing all the varieties of beans upon three uniform plots, of exactly the same shape and size.
2. Each plot may consist of (*a*) eight rows 16 feet 6 inches long; (*b*) four rows 33 feet long; (*c*) two rows 66 feet long.
3. The rows should be twenty-five inches apart.
4. Plant the beans six inches apart in the rows, thus using 264 beans of each variety.
5 When the young plants are about four inches tall, count the number on each plot, and if necessary pull a few plants in some of the plots in order to have exactly the same number of plants remaining of each variety.
6 The plants of each variety should be pulled and counted as soon as they ripen, and when dry threshed by flail immediately on being brought in from the heat of the sun, and the grain weighed.

Varieties.	Estimated value.	Relative size.	Bushels per acre, 6 tests.
Medium or Navy	100	53	21.3
Marrowfat	71	100	20.2
White Wonder	77	43	16.1

In 1899 three varieties of Canadian beans were selected for the Union experiment No. 14 The large, medium, and small classes of beans were all represented by using one of the very best varieties of each class.

Conclusions.

1. The White Wonder variety of beans did not do as well over Ontario in 1899 as it did in 1898.

2. The Marrowfat beans are about twice as large as the Medium or Navy beans and about two and one-half times as large as the White Wonder beans.

3. The average height of the three varieties of beans was as follows: Marrowfat, 18 inches; Medium, 16 inches; and White Wonder, 12 inches.

No. 15.—Testing Three Leading Varieties of Japanese Beans.

(For "Instructions" see experiment No. 14.)

Varieties.	Estimated value.	Yield per acre.	
		Straw. (tons). 4 tests.	Grain. (bushels). 4 tests.
Medium Green	72	2.6	22.4
American Coffee Berry	60	1.4	21.3
Extra Early Dwarf	86	1 1	12.7

The Soy beans (Glycine hispida) is a leguminous plant native of Japan and China, and ranks very high from a chemical point of view. The plant is an annual, erect in growth and branches profusely. There are a large number of varieties, nearly all of which are too late for the conditions of Ontario. The different varieties are distinguished largely by the time required for the plants to mature and by the color of the seed; the yellow, the green, and the black, being the most common. The Soy beans are used for

green fodder, silage, hay, pasture, and as a soil renovator, and the grain is used as a feed for live stock. These beans have been used as a food for man from the earliest times in Japan and China, and more recently in the European countries. They are not used as a food by themselves, but are made into different complex forms, of which five are quite common among the Japanese, namely: natto, tofo, miso, yuba, shoyu.

Conclusions.

1. The Soy beans gave very good results in the Union experiments in 1899.
2. The medium green Soy beans which gave the largest yield of grain per acre of the three varieties tested over Ontario in 1899, is the latest of the three varieties.
3. The American Coffee Berry was the most popular variety with the experimenters when yield, time of maturity, etc., were all taken into consideration.

No. 16.—Testing Four Leading Varieties of Carrots.

1. Prepare for sowing all the varieties upon four uniform plots, of exactly the same shape and size.
2. Each plot may consist of (*a*) eight drills, 16 feet 4 inches long; or (*b*) four drills, 32 feet 8 inches long; or (*c*) two drills, 65 feet four inches long.
3. The drills should be twenty-five inches apart.
4. Sow all the seed of each variety as evenly as possible.
5. Thin out the young plants in the drills to an average of ten inches apart, leaving 396 roots of each variety.
6. Again count the plants when about 8 inches tall, and if necessary, remove a few of the plants from some plots in order that the number of roots on the different plots will be exactly the same.

Varieties.	Estimated value.	Tons per acre. 14 tests.
Pearce's Imported Half Long	100	26 6
Large White Belgian	76	26.2
Guerande	76	22 6
Danver's Orange	69	22.0

Sixty varieties of field carrots have been grown at the Ontario Agricultural College and from this list four kinds were selected for the co-operative experiments in 1899.

Conclusions.

1. The Pearce's Improved Half Long White variety of carrots took the lead in point of yield in the co-operative experiments in 1896, 1897, 1898 and in 1899, and is very similar to the Steele Improved Short White which took the lead in 50 per cent. of the experiments in 1892, 43 per. cent. in 1893, 55 per cent. in 1894, and 63 per cent. in 1895.
2. The White fleshed varieties of carrots gave better yields of roots than the yellow fleshed varieties in 1893, 1894, 1895, 1896, 1897, 1898 and 1899.
3. Pearce's Improved Half Long White was the most popular, and the Danver's Orange was the least popular of the carrots tested over Ontario in 1899.

No. 17. Testing Three Varieties of Mangels and One Variety of Sugar Beets.

(For "Instructions" see experiment No. 16.)

Varieties.	Estimated value.	Tons per acre. 33 tests.
Evans' Improved Mammoth Saw Log	97	31.8
Carter's Champion Yellow Intermediate	100	30.4
Carter's Warden Yellow Globe	74	27.6
Danish Improved Sugar Beets	73	27.3

Besides sowing three varieties of mangels, one variety of sugar beets was also included in experiment No. 17.

Conclusions.

1. Evans' Improved Mammoth Saw Log variety of mangels has given the largest average yield per acre among the varieties used for co-operative experiments in each of the four years in which it hes been used in these tests.

2. The Danish Improved variety of sugar beets gave an average of four and a half tons per acre less than the Evans' Improved Mammoth Saw Log varieties of mangels.

3. Although the Evans' Improved Mammoth Saw Log variety of mangels gave the largest yield of roots per acre, it is found that the Carter's Champion Yellow Intermediate variety was the most popular among the experimenters, and that the Danish Improved variety of sugar beets was the least popular.

4. The sugar beets grow considerably under ground and require much more labor in harvesting than any of the varieties of mangels.

No. 18. Testing Two Varieties of Swedish and Two Varieties of Fall Turnips.
(For "Instructions" see experiment No. 16.)

Varieties.	Estimated value.	Tons per acre. 5 tests.
Cow Horn	53	20.5
Jersey Navet	67	18.6
Hartley's Bronze Top	100	14.9
Carter's Imperial Hardy	47	13.3

For the co-operative experiments in turnips, two leading varieties of the Swedish class and two of the leading varieties of the fall turnips were selected.

Conclusions.

1. The fall turnips gave larger yields of roots per acre than the Swede turnips in the co-operative tests in 1894, 1895, 1896, 1898 and 1899, and one of the varieties occupied the highest place in 1897.

2. The Cow Horn variety of turnips was used in the co-operative experiments in 1899 for the first time, and gave nearly two tons per acre more than the Jersey Navet variety.

3. The Hartley's Bronze Top Swede turnip was selected as the most valuable turnip tested by the various experimenters in each of the years 1897, 1898 and 1899.

No. 19. Sowing Peas at Different Dates to Determine the Relative Amount of Injury Done by the Pea Weevil.

1. Prepare for sowing all the packages upon four uniform plots, each plot being exactly one rod square (sixteen and one-half feet).

2. Drive wooden stakes at the four corners of each plot and leave a clean path three feet wide between each two plots.

3. As soon as the land becomes sufficiently warm, run a line around the first plot and sow one of the packages of peas inside of the line; two weeks later sow the second package on the second plot; and two weeks later sow the third package on the third plot; and still two weeks later sow the last package on the last plot. Aim to have the land in the same state of cultivation for each sowing, and have the peas well covered every time.

4. After the plants are up two or three inches again run the line around each plot and cut off every plant outside of the line.

5. The crops should be cut as soon as they ripen, and when dry, weighed and threshed by flail immediately on being brought in from the heat of the sun and then the grain should be weighed by itself.

6. Carefully examine the peas for the pea bugs (weevils) by splitting open 200 peas from each plot and counting the number of bugs which may be in the form of either little white worms or little darkish brown beetles.

Average date of seeding.	Per cent weevilly.	Bushels peas per acre.
		Three tests.
April 30	83	17.9
May 13	76	13.7
May 25	67	11.9
June 6	46	6.2

The pea weevil, commonly known as the pea bug, is very troublesome in some parts of Ontario. In fact, many farmers have quit growing peas owing to the severe ravages of the weevil. It is the practice of some to sow their peas quite late in the season, in the hope of securing the crop without the serious trouble of from one-half to three-quarters of the peas being infested. In our experience at the Agricultural College we have found that by late sowing we have harvested peas which were as a rule somewhat freer from the weevils than those produced from an earlier seeding, but, at the same time, the yield of crop was also much less. In 1899 we sent good sound peas to those over Ontario who wished to join us in obtaining more definite information regarding the influence of the weevil by sowing at four different dates in the spring, and as a result we have received the reports of three successfully conducted experiments.

Conclusions.

1. In each of the experiments the percentage of weevilly peas decreased as the date of seeding advanced.
2. With two slight exceptions, the yield of peas from each plot decreased as the date of seeding became later.
3. The yield from peas sown on the 6th of June was only about one-third as great as from peas sown on the 30th of April.

No. 20. Planting Potatoes Immediately after and Five Days after Cutting.

1. Prepare for planting all the potatoes received on uniform plots of equal size.
2. Each plot may consist of (*a*) six rows, each 16 feet 6 inches long; or (*b*) three rows, each 33 feet long, or (*c*) one row 99 feet long.
3. The rows should be thirty-three inches apart in every instance.
4. Count the potatoes in one of the packages and then cut them into sixty-six pieces. Five days later, count the potatoes in the other package and also cut them into sixty-six pieces.
5. Plant both packages of potatoes on the two plots immediately after the second lot is cut. Start to plant nine inches from the end of each row and drop the pieces eighteen inches apart. There will thus be room for exactly sixty-six pieces in each plot.
6. Watch when the plants first appear and also the comparative vigor of growth of the crops on the two plots
7. Count the number of hills of potatoes which grew on each plot.

Time of planting.	Bushels per acre.		
	4 Days Period. 17 tests.	5 Days Period. 192 tests.	6 Days Period. 9 tests.
Immediately when cut	224	178	180
4, 5, or 6 days after being cut	197	166	165

The following table gives the average results of planting seed potatoes immediately after and from four to six days after being cut, for three years over the Province, and also for three years at the Ontario Agricultural College :—

Time of planting.	Bushels per acre.		
	Farms over Ontario.		O. A. C. 3 years.
	1899, 218 tests.	3 years, 240 tests.	
Immediately when cut	182	184	195
From 4 to 6 days after being cut	168	165	176

Some people cut their seed potatoes in the evening and on rainy days and plant them several days later, while others cut their seed potatoes and plant them immediately. Experiments have been conducted at the College in three different years in order to ascertain the comparative results from the two systems. In every case, the freshly cut potatoes gave better results than those which were cut four or five days before planting. In the experimental work conducted by the Union in 1888 and in 1889, a similar test was carried on as a part of a larger experiment. In 1899, it was placed on the list as a separate experiment, and it was selected by a great many experimenters throughout the Province, and the results are both interesting and suggestive.

Conclusions.

1. Seed potatoes which were planted immediately after they were cut produced a a larger average crop by at least twelve bushels per acre than seed potatoes which were cut and allowed to remain four, five or six days before they were planted in the average of the experiments conducted on two hundred and eighteen Ontario farms in 1899.

2. In the Union experiments for each of three years, and also in the College experiments for each of three years, the seed potatoes which were cut and planted immediately afterwards gave decidedly better results than those which were cut from four to six days before they were planted.

3. In 1899, fully two thirds of the experimenters favor planting the seed potatoes immediately after they were cut.

No. 21. Growing Corn in Drills and in Squares.

1. Measure off two uniform plots, each exactly four rods square (66 feet to each side). Leave 16 feet between the plots for a horse to turn when cultivating the corn.

2. Plant both plots on the same day and as follows:

No. 1 Plot—(*a*) Plant the corn in twenty-two drills, each four rods long. (*b*) Allow three feet between the rows. (*c*) Drop the kernels 9 inches apart in the rows.

No. 2 Plot—(*a*) Plant the corn in twenty-two rows of hills, each four rods long. (*b*) Allow three feet between the hills each way. (*c*) Drop four kernels in each hill.

3. Cultivate No 1 Plot in one direction and No. 2 Plot in two directions but put exactly the same amount of work on the soil of each plot. Use flat cultivation throughout.

4. Cut all the corn in one day and before it becomes badly frozen. Weigh the whole crop from each plot as soon as cut and then husk, weigh and carefully examine the ears.

Planting.	Estimated value.	Tons per acre.	
		Ears. 9 tests	Whole crop. 10 tests
Squares	100	2.7	11.5
Drills	7	2.2	10.3

There is a great difference of opinion among corn growers as to which is the best way to plant—some advocating the squares or hills and others the rows or drills. An experiment was arranged last spring in connection with the Union work by which one plot containing sixteen square rods was to be planted with the corn in squares and another plot of equal size was to be planted with the corn in drills; the same amount of seed being used in the two plots. Ten reports of successfully conducted experiments were received.

Conclusions.

1. The corn which was planted in squares produced a larger average yield of whole crop and of ears than the corn which was planted in drills.

2. The corn which was planted in squares gave a larger yield than the corn which was planted in drills by one and one-fifth tons per acre, nearly one-half of which was in the form of ears.

3. The experimenters decided in the proportion of fourteen to one in favor of planting in squares as against planting in drills.

No. 22.—Testing Six Leading Varieties of Potatoes.

1. Prepare for planting all the potatoes received upon uniform plots of equal size.
2. One row 66 feet long is required for each variety. If the rows are placed side by side, a distance of 30 inches should be allowed between the rows.
3. First count the potatoes, and then cut them in such a way that there will be exactly 66 pieces of each variety.
4. Plant the pieces 1 foot apart in the row.
5. Count the number of hills of potatoes before digging the crop.

Varieties.	Days from seeding to maturity. 12 tests.	Table quality. 16 tests.	Percentage of crop marketable. 18 tests.	Yield per acre (bushels). 19 tests.
Empire State	119	100	86	204
American Wonder	123	83	84	188
Tonhocks	96	87	72	172
Burpee's Extra Early	99	96	74	169
Troy Seedling	127	60	80	168
Stray Beauty	92	57	71	158

Two hundred and forty-one varieties of potatoes have been grown in the experimental grounds at the Agricultural College. From this list a selection was made of those leading varieties representing those which were late, medium, and early in reaching maturity. Five pounds of each of these varieties were sent out in the spring of the present year to ex-students of the College who had paid their annual fee to the Union and who wished to conduct the experiment with potatoes.

Conclusions.

1. The Empire State variety occupied first place in yield of potatoes per acre in the co-operative experiments over Ontario in 1894, 1895, 1896, and 1899; second place in 1898; and third place in 1897. It is also one of the heaviest yielders among all the varieties which have been grown in the Experimental Department at the College.

2. The experimenters selected the Empire State as being the best variety for general crop and the Burpee's Extra Early as the best variety for early use.

3. Of the six varieties of potatoes used for the co-operative experiments for 1899, the American Wonder proved to be the latest and the Stray Beauty the earliest—there being a difference of twenty-seven days between the time required for these two varieties to reach maturity.

4. In table quality the Empire State and the Burpee's Extra Early proved to be the best and the Stray Beauty and the Troy Seedling decidedly the poorest.

5. The Empire State had the largest and the Stray Beauty the smallest percentage of marketable potatoes in the crop produced on the farms on which these tests were made in 1899.

No. 23.—Testing Three Leading Varieties of Winter Wheat.

Instructions.

1. Select a portion of uniform soil and mark off three plots each sixteen and one-half (16½) feet square. Allow a path three feet wide between each two consecutive plots. Should an extra variety be sown, the extra plot should be made similar to each of the other three plots.
2. Drive stakes at the four corners of each plot.
3. Sow the respective varieties upon the different plots. It is an advantage to run a strong cord around each plot and sow inside the line.
4. After the grain is up three or four inches, again run the cord around each plot and cut off any plants that are outside of the line.
5. In harvesting the plots, watch carefully the requirements of the blank form on this page.
6. The crops should be cut as soon as they ripen, and when dry, weighed and threshed by flail immediately on being brought in from the heat of the sun.

Varieties.	Yield per acre.	
	Straw tons.	Grain bushels. 72 tests.
Dawson's Golden Chaff	1.3	22.5
Stewart's Champion	1.1	22.4
Early Red Clawson	1.3	22.1
Early Genesee Giant	1.2	21.3
Imperial Amber	1.3	20.4
Bearded Winter Fife	1.1	19.4
Golden Drop	1.0	16.2

Three of the foregoing varieties have been used in the co-operative tests of Ontario for each of the past six years. The next table gives the average results of the six years' experiments with each of these varieties at the Agricultural College and also throughout Ontario.

Varieties.	Yield per acre.	
	O. O. C. tests (average 6 years)	Ontario tests (average 6 years)
Dawson's Golden Chaff	47.5	30.4
Early Genesee Giant	43.5	27.6
Early Red Clawson	43.5	27.6

The results of the winter wheat experiments were sent to three hundred and sixty of the newspapers of Ontario in the autumn of 1898 between the time of harvesting and seeding. The seven varieties of winter wheat, which were sent out in the autumn of 1898 were divided into three sets—the Dawson's Golden Chaff being used in each set. By having one variety included in each set, a basis of comparison was formed by which all the varieties could be compared with one another. The grain was sown at the rate of one and one-third bushels per acre.

Conclusions.

1. In the average yield of winter wheat per acre, the Dawson's Golden Chaff stood highest among 11 varieties tested over Ontario in the year 1893, among 9 varieties in each of the years 1894, 1895, and 1896, and among 7 varieties in each of the years 1897, 1898, and 1899.

2. In the co-operative experiments for 1899, the Stewart's Champion, Bearded Winter Fife, and Dawson's Golden Chaff came through the winter the best, and the Golden Drop the poorest.

3. The Early Red Clawson and Imperial Amber were the first and the Bearded Winter Fife and Stewart's Champion were the last to mature in 1899.

4. Dawson's Golden Chaff and the Early Genesee Giant possessed the strongest straw and the Bearded Winter Fife the weakest straw in the tests of the present year.

5. Stewart's Champion and the Bearded Winter Fife produced the longest and the Golden Drop the shortest straw in 1899.

6. In the co-operative experiments of each of the past six years, the Dawson's Golden Chaff was one of the least and the Early Genesee Giant was one of the most affected by rust.

7. In 1899 all varieties were practically free from smut as the seed used was so free from the smut spores.

8. Stewart's Champion and Dawson's Golden Chaff produced the plumpest and Imperial Amber and Early Red Clawson the most shrunken grain in this year's tests.

9. Stewart's Champion and Dawson's Golden Chaff were the most popular varieties and the Golden Drop was the least popular variety with the experimenters in 1899.

10. During the past seven years, the Dawson's Golden Chaff has been an exceedingly popular variety with the farmers who have been conducting these co-operative experiments throughout Ontario.

CO-OPERATIVE FRUIT TESTING.

H. L. Hutt, B.S.A., Director of Co-operative Experiments in Horticulture, Ontario Agricultural College, Guelph.

The co-operative testing of small fruits was begun in 1894 with sixty experimenters. Each year since then the work has been steadily increasing, and this year plants were sent to 225 experimenters.

The following table gives an idea of the scope and progress of the work during the past six years :

	1894	1895	1896	1897	1898	1898	Total.
Number of Experimenters	60	100	120	150	225	225	880
Plants distributed :—							
Strawberries	720	960	960	2,400	4,800	4,800	14,640
Raspberries	360	480	480	480	600	600	3,000
Black Raspberries	360	480	480	480	600	600	3,000
Blackberries	.....	.....	480	480	600	600	2,160
Currants	180	240	240	240	300	300	1,500
Gooseberries	... .	240	240	240	300	300	1,320
Totals	1,620	2,400	2,880	4,320	7,200	7,200	25,620

The interest in this work is increasing year by year, and although we are now sending out nearly five times as many plants as were sent out when the work was begun, yet the demand for plants has always been far in excess of what we could supply. In fact we have sometimes wished when the applications for plants were coming in so fast that those who receive them would be just as eager to report upon them afterwards. The value of this work, however, cannot be judged altogether by a summary of the reports sent in by experimenters. The greatest value naturally accrues to the experimenters. We send out 4 varieties of each kind of fruit under test which from our own and other experiments we think are most likely to give the best results throughout the country. Each experimenter then finds out for himself which of these is best adapted to his particular soil and locality. From the plants sent, he may, with proper management, propagate enough new plants to set out a plantation sufficiently large to supply the needs of an ordinary family. In this way many are getting a start in growing small fruits for their own use, who would otherwise probably never have given a thought to it. From the reports sent in we are pleased to learn that many are availing themselves of the opportunity. One experimenter mentions in his report that from the black raspberry plants sent to him he now has plants enough of the variety which did best with him to set out about two acres.

The following is a list of the plants distributed for co-operative testing last spring :—

100 lots of strawberries — Clyde, Haverland, Van Deman and Woolverton — twelve plants of each.

25 lots of raspberries—Cuthbert, Golden Queen, Marlborough and Shaffer—six plants of each.

25 lots of black raspberries—Gregg, Hilborn, Palmer and Souhegan—six plants of each.

25 lots of blackberries — Gainor, Kittatinny, Snyder and Taylor — six plants of each.

25 lots of currants — Fay's Prolific, Raby Castle, Victoria and White Grape — three plants of each.

25 lots of gooseberries — Downing, Pearl, Industry and Whitesmith — three plants of each.

No report of yields could be expected from these before another year, but the majority of experimenters report that the plants were received in good condition, and notwithstanding the protracted drouth of last summer, many report that the plants have done well. About 50 per cent. of those reporting state that they have a full stand of plants.

Owing to the intense cold of last winter, when the ground was bare of snow, many of the plants, such as raspberries and blackberries, previously planted, were severely winter-killed. And for this reason not only the yields but the number reporting the yields this year are far below the average. In the following tables is given a summary of the yields from the different fruits sent out during the past four or five years :—

Strawberries.—The following table gives the yield in ounces per dozen plants :

Varieties.	Date of planting.	
	1898. 15 expts.	1897. 3 expts.
1. Clyde	179.4	.....
2. Woolverton	124.9	40.7
3. Haverland	124.6	29.0
4. Van Deman	84.5	7.8
5. Bubach	.....	17.9

Clyde, which comes at the head of the list, is a new variety and is, probably, one of the most valuable varieties yet introduced. Our first plants of it, obtained three years ago, cost us $2.00 per dozen. It is a thrifty, vigorous plant-maker, produces uniformly large, well shaped berries, which, although rather light in color, are firm and of good quality. In productiveness, Clyde has ranked near the head of the list in our College experiments for the past two years we have fruited it among about 220 varieties we have had under test. It was distributed last year to 100 experimenters in place of Bubach, which, although a large fine berry, does not make plants enough to give a very heavy yield. Haverland and Woolverton are two choice varieties, and they come out practically about the same in these tests. Woolverton, however, does a little better than Haverland the second season of fruiting, as may be seen by referring to the yields given for plants set out in 1897. By comparing the results for the two years we have valuable proof of the fact that the first crop from a strawberry plantation is by far the best, and it is very seldom that it pays to leave the plantation for a second crop. Van Deman, the variety standing fourth on the list, has made rather a poor showing as far as yield is concerned, but for earliness and handsome fruit it has always ranked high in our experiments at the College.

Raspberries.—In the following table the yields are given in ounces per bush.

Varieties.	Date of planting.		
	1898. 3 expts.	1897. 5 expts.	1896. 1 expt.
1. Shaffer	10.8	51.4	24.
2. Cuthbert	14.6	37.0	42.
3. Golden Queen	10.1	28.6	8.
4. Marlboro	6.4	34.6	38.

This is one of the experiments upon which the severity of the past winter was very marked. Many of those reporting say that the plants were frozen down to the ground. Consequently there were comparatively few who sent in a well kept record of the yields, and those reported are below the average. Shaffer heads the list for those plants sent out in 1897, while Cuthbert comes first for those planted in 1896 and 1898. From the reports sent in, Shaffer appears to have stood the winter in most places quite as well as the other varieties which are usually considered more hardy. While too much value must not be attached to comparison of yields here recorded, because of the severity of

the past winter, and the limited number of yields reported, yet we can say from our own experiments at the College, where we have had four times the number of varieties under test, that each of the varieties in this experiment is among the best of its kind and should be in every home collection. Marlboro is one of the best of the early varieties, Golden Queen ranks first among those giving a late yield and is the most satisfactory of the yellow varieties, Cuthbert still ranks as the "Queen of the Market," and Shaffer is one of the heaviest yielders, and the one most prized in the home garden.

Black Raspberries.—In the table below the yields are recorded in ounces per bush.

Varieties.	Date of planting.				
	1898. 10 expts.	1897. 4 expts.	1896. 1 expt.	1895. 2 expts.	1894. 1 expt.
1. Hilborn	128.2	37.8	10.0		
2. Palmer	122.5	53.9	12.8	41.5	21.0
3. Gregg	67.4	27.7	15.3	37.8	21.0
4. Souhegan	46.9	48.1	7.5	40.0	21.5
5. Tyler				34.0	20.0

From our black raspberry experimenters we get a great variety of results and opinions, so much so that each variety under test has in one place or another come out at the head of the list. On the whole, however, Hilborn and Palmer have made the best showing.

Blackberries.—The yields given in the following table are in ounces per bush.

Varieties.	Date of Planting.	
	1898. 2 expts.	1897. 2 expts.
1. Kittatiny	0.3	16.6
2. Snyder	1.5	10.3
3. Gainor	1.0	9.6
4. Taylor	1.6	5.1

This is another of the experiments with which the severity of last winter played havoc. The majority of those reporting upon it state that the most of the plants were killed down to the ground, and in some cases were killed outright. From the small number of yields here recorded it would not be safe to draw any conclusions as to the relative productiveness of the varieties under test. Kittatinny is one of the most popular varieties in sections where the blackberry is largely grown, and it headed the list in 1898 among those varieties under test at the College. This year Agawam holds first place, it being one of the few which came through the winter uninjured.

Currants.—The yields recorded below are in ounces per bush.

Varieties.	Date of Planting.			
	1898. 4 expts.	1897. 7 expts.	1896. 6 expts.	1895. 3 expts.
1. Raby Castle	2.9	39.9	19.4	38.5
2. Victoria	2.3	34.9	23 5	51.6
3. Fay	2.1	27.6	16.5	9.1
4. White Grape	1.7	17.3	37.4	11.5

The results given in the foregoing tables are the averages of twenty complete experiments with plants set out during the past four years. For those set out in 1897 and 1898 Raby Castle holds first place. This is a very heavy yielding variety, but it is a smaller currant than any other on the list. Fay is one of the largest and finest currants, but in these experiments it has not yielded so well as the others, although in our College experiments this year it holds first place over all other varieties under test. Victoria is a good sized productive variety, well worthy of a place in any collection. White grape is one of the finest of currants, and previous to this year it has always proved to be one of the heaviest yielders. For a home variety it has no equal, but in the market the red and black varieties are more in demand.

GOOSEBERRIES.—The yields recorded below are in ounces, per bush., being the average of 28 complete experiments, with plants sent out during the past four years.

Varieties.	Date of planting.			
	1898. Eleven experiments.	1897. Five experiments.	1896. Five experiments.	1895. Seven experiments.
1. Houghton	19.4	45.2	32.0	51.1
2. Downing	14.5	39.2	27.0	50.4
3. Industry	7.8	21.1	12.0	27.0
4. Whitesmith	4.6	24.5	7.0	26.0

The two varieties at the head of the list are of American origin, while the other two are English varieties. Between the two classes there is a very marked difference. Our American varieties, as is clearly shown by the results given above, are by far the heavier yielders, although the English varieties produce much larger and finer berries. The susceptibility of the latter to mildew is the great obstacle to their success in this country. Of the two American varieties Downing is the larger and finer berry, and in our College experiments it has, for the past two years, ranked ahead of the Houghton for productiveness.

TREASURER'S REPORT, 1899.

RECEIPTS.

	$ c.
Balance from 1898	292 91
Membership fees	103 50
Government grant	1,200 00
Sale of weed seeds	5 00
	$1,601 41

EXPENDITURE.

	$ c.
Agricultural experiments	799 89
Horticultural "	170 65
Soil physics "	27 90
Botanical "	14 55
Annual meeting, 1898	143 23
Advertising meeting, 1899	76 50
Expenses of executive	28 18
Salary of editor and Secretary	105 00
Balance on hand	235 21
	$1,601 41

We, the undersigned Auditors of the Ontario Agricultural and Experimental Union, beg leave to say that we have examined the accounts of the Treasurer, and find them to be correct.

G. H. HUTTON.
G. A. PUTNAM.
Auditors.

Ontario Agricultural College, Dec. 7th, 1899.

INTENSIVE FARMING.

By George T. Powell, Ghent, N. Y.

There is perhaps no one problem that has caused more thought and discussion than the migration of the population from the soil. This subject has engaged the first thought of the ablest men of all countries. We have seen the marked tendency of population to leave the country and to concentrate in cities. This has been true in all portions of Europe; it has been particularly true in the United States; and you are not without exception here in Canada. There has been very much discussion going on as to the cause which would send a population drifting from the soil to the cities, cities naturally of trade and commerce carried on extensively. Railroads to-day are seeking cities as their terminus, and they necessarily are instrumental in carrying large numbers to city centres. Manufacturing has also of late years been concentrating in cities, and so we see another cause calling laboring classes in large numbers to city centres. Perhaps the depletion of the soil may carry its own responsibility also for the movement or migration of population from it. We recognize that there have been great changes in methods in farming. There is a tendency to overlook the intensive system while the extensive system is carried out. That of itself is a prominent cause for driving the population away from the soil, because in the extensive principle machinery is used to a large extent, and where machinery is largely introduced human labour is naturally discontinued, and less labour is called for on the farm by the introduction of machinery upon the extensive system of farming. We find to-day that all lines of industrial work are overcrowded; there are more people to-day concentrated in cities than there is occupation for. Manufacturing industry has been stimulated to a great extent, and the question now arises, what is to be the solution of the question of over-populated cities and depopulated country districts? I have thought upon this question and studied it, and it seems to me that agriculture to day offers a new field for development along some new lines, and the especial lines which I shall discuss this afternoon is that of a more intensive system of agriculture. There is the danger in concentration of large numbers in cities, where they cannot be profitably employed, of their becoming largely non-consuming. That is, the growth of cities should naturally be a great benefit to the producing class. If there is a large population in cities it is impossible for all to procure profitable employment, and they fall into a large dependent class, and the larger the dependent class becomes in a city the less profitable do they become to the producers of the soil. Now arises the question of a more intensive system by which larger numbers of people may be profitably employed in the culture of the soil. I believe it is through this channel that we have yet to see a new development in the pursuit of agriculture—the intensive system, which means the cultivation of smaller holdings. We all understand, who are dealing with these practical problems of the production of the soil, that two things which have happened recently, somewhat of a decline in yield accompanied by lowering development, cause a great deal of discouragement and depression among the agricultural class. Moderate yield, or no yield accompanied by low prices brings the farmer into a condition which it is difficult for him to know how to meet, and we have been passing through this period now for a number of years. . . . I think the great fault is that we are attempting to spread over too many acres. The lesson of the future should be concentration of acres; it should be aiming at maximum yields as one of the first principles in solving the question of the reduction of cost. Take, for instance, wheat culture. The farmer who is producing twenty bushels of wheat per acre is running very close to the line of having his profits entirely consumed by cost; when he can have ten more bushels of yield per acre he is rising beyond that line; if he can secure a yield of wheat that will reach 30 or 40 bushels to the acre it does not matter so much what the price will be, he is above the cost line considerably, and he can stand the period of low prices because he has brought his land to a condition where he is producing maximum yields; he gets beyond the cost line, and although the value may be low per bushel yet withal he receives a margin of profit through his maximum yield. This will apply to all farm crops; from potatoes and all kinds of roots to any of the cereals which we produce. The average for the United States in potatoes does not exceed in the present year sixty bushels per acre. While that

s true there are instances where the yield has run to 400 or 500 bushels in individual localities. The class of producers who fall within this average are the class who are suffering to-day from severe agricultural depression; those who get beyond the average and reach the maximum yields, even though low prices exist, are those who are to-day solving the problem of successful agriculture. So it is along the line of intensive culture that we are to solve the problem of a country leaving the pursuits of agriculture, and of drawing away a large non-consuming population from many of our large cities. I shall be pleased this afternoon to deal along the lines of horticultural work, because that is the special work carried on in many instances. I have been interested while among you for a few days by the discussion carried on by the Ontario Fruit Growers' Association. Studying along the line of intensive culture we need to study with it the products which will have the highest value; and to-day there is nothing which promises a better value than along the horticultural line of work. Apple culture is destined in the near future to be one of the most profitable as well as interesting lines of study. The apple seems to be a fruit which is staple in character, and one greatly in demand in all our home and foreign markets. During the year 1896, when there was a phenomenal apple crop both in Canada and the United States, apples were introduced in markets where they had never before been introduced, with the result that by a single introduction in some of the German markets the Canadian and American specimens were thought to be so fine that in a very short period of time a strong demand has grown up in those same German markets. The English market is also calling for a vast quantity of apples grown upon this soil, because the English people recognize the exceedingly fine quality which is put into that superior fruit by the climatic conditions on this side of the Atlantic. Apple culture offers to young men one of the finest fields for development. The question now arises to the young man, or old one, if he proposes to take five acres, or ten acres, or fifteen acres of land and plant them in an apple orchard, of bringing that orchard into productiveness in the shortest possible period of time. We cannot to-day, in this age of rapid development—we cannot in this day of exceedingly sharp and keen competition which is springing up in all parts of the earth—we cannot afford to plant orchards and then wait ten or fifteen years to bring them to bear for us. That has been too much the case. We have simply planted trees and rested with that as our duty, and we have had supreme failures. He will be wisest who studies those laws and forces, and works in the greatest harmony with them; and so in planting an apple tree or an orchard we must study the law of development, and we can bring to that a very great aid indeed in shortening the period in which the apple orchard can be brought to bearing. By way of illustration, we want to study the question of the inherent principle of early bearing trees; we want to study the question of individuality in trees. If we plant a hundred trees we want to recognize the fact that each of those hundred trees differs in some respect, that no two are going to develop the same, but there are distinct differences existing in the hundred trees we put out. The lesson of to-day is for the cultivator of the orchard to study those individual differences, and to discover if he can the most valuable qualities, and then work from the standpoint of selection and propagate from those which give him the best representatives of their kind. Now for a practical illustration of what this will do. I think the average length of time in which orchards are brought to bearing will exceed twelve years. You may look over your country and go back over the history of apple culture in those districts where apple growing is carried on extensively, and I think you will agree with me that before an orchard comes into bearing a period of twelve years is usually covered. In some instances fifteen, in other instances twenty years will have passed before much fruit is obtained from the orchards. Starting out on the individual and more extensive method of development of orchards a few years since, we selected as a basis a variety known to be exceedingly vigorous and strong in its constitutional growth. I mention now the Northern Spy. The Northern Spy tree is one which has an exceedingly fine close wood, and in consequence of the character of its wood presents a strong resisting power against disease and also against certain types of insects. Now, this is an important fact, to understand these differences in the constitutionality of trees. Hence the Northern Spy was chosen as a foundation on which to work. Now, by way of illustration. It was desired to grow in many instances the King apple, which truly is a king of apples. The Tompkins Co. King pre-

sents in our own market and in the English market the height of excellence. It is a fruit that possesses exceedingly fine flavor and high quality; it is beautiful in color, and at the same time desirable in form and size; and yet in some cases the Tompkins Co. King grown upon its own stock is defective; it is constitutionally weak. Its period of life will not extend in many instances beyond fifty years, and hence you get but a very few years of fruit bearing from the tree because of this constitutional defect in point of vitality. Under those circumstances you could not be advised to plant King orchards; in other circumstances you may be advised. That is, choosing as the foundation this strong, vigorous, healthy stock presented in the Spy, and equally so in your vicinity in the Tallman Sweet, which is another tree of like characteristic in regard to its vigor and hardiness and constitutional strength. Now then, having chosen this foundation to work upon, comes the question of transferring the King variety upon the hardy stock of Northern Spy or Tallman Sweet. What were the exact processes? That is what we want to know. I have been delighted to see the methods pursued in this direction by those of you who are interested in the development of horticulture in Canada. I am glad to be able to give you an account of a few years' experience along this line which may be helpful to you. The processes were these: In transferring this constitutionally weak variety of apples on to a large orchard, in order to have a successfully producing orchard, the individual characteristics of trees were studied before the buds were taken from them. And so the points are simply these. In the selection of buds or scions to be transferred the general characteristics and form of the tree itself were taken into account. Before the scion was cut the tree was studied to know whether it was naturally a fine tree in its form and in its growth, eliminating thereby the necessity for continuous and excessive pruning, a very important matter to study along the line of intensive culture.

Mr. Mills: Do you mean the tree on which you were to graft the other?

Mr. Powell: The tree from which the scions were taken. We are going to transfer a new tpye to a new orchard. We are going to eliminate on the intensive method of culture much of the process of growing. So the fruit grower must first be a horticultural architect, and he must study the form of tree just as closely and as minutely and carefully as he would study the form of a building. That is the principle. Secondly, the form and character of the fruit. Most of you, and especially your experimenters, have discovered that on almost all trees there is a difference between the form of the fruit. All trees do not produce uniformly. Some trees will produce a certain amount of fine fruit, others will produce a large amount of uniform fruit. Now, we want to select carefully from trees which we find on close study of their fruits give the best uniformity. Then take the scion or bud from that tree and transmit that property or principle to the new orchard. That is the second vital point under consideration. Third, study the tendency and character of trees and plants with reference to their tendency to come into bearing early. Some trees will produce wood for years; others again will show a tendency and a development in the direction of producing fruit in a comparatively short period of time. Make that distinction clear in the mind, that in transferring the one to the other the tendency of early bearing shall be transferred, and the period, I have proven, can be shortened fully one half in bringing a new orchard into profitable value. I want to give an illustration of the subject. Having been working on this principle now for about seven years I am very glad to be able to give you now the positive results which have come from it. Believing in this, and working along this line for a few years, there is satisfaction in being able to give you positive results. I hold in my hand here, and you will take an opportunity to examine it, wood from young trees which have been treated in the way I have indicated and discussed. This is known as the Southern Beauty; as beautiful as the King, nearly as good as the King, and in many ways superior. Buds were taken from trees showing a tendency to early maturity and uniformity in the character of their fruit. This wood represents the growth upon a graft which was set three years since, and from some of this same wood averages were taken producing two bushels of apples the third year from the time the grafts were set. There seemed to be no exception; every specimen was absolutely perfect; it would all grade and number one in quality. This seems to be in response to the efforts made in this direction, to transfer that tendency from a tree which has been known for years to do that thing, and get it in three years from a young tree. This has

been broken a good deal, but you will see upon this young wood a very fine development of fruit buds. These trees have been under very intensive culture. From the time of the opening of spring until cultivation should cease the ground was very highly tilled; and, although in New York State we passed through an exceeding severe drouth, continuing for six months, with no rainfall to wet the roots of the trees scarcely once during the season, you can see the amount of growth made on these trees altogether that bore the two bushels of apples, and in addition the producing of very fine fruit buds, all under very unfavourable conditions. Here is where the value of intensive methods comes in: under adverse conditions the development can be carried on to a degree which will give you satisfactory results. So we have here good wood for next year, and a good development of fruit buds to produce for the next season. I want to show you also the possibility of developing the early tendency to produce fruit in a peach. I hold in my hand some peach wood taken from trees that had been growing on the soil for a year and a half when the buds were developed, and yet during the past season there has been an exceedingly fine development of fruits buds on those peach trees which have grown but one year and a half. The soil has been put into the finest possible chemical condition and kept so. The result has been that there has been a very fine growth not only of tree, but there has been a remarkable development of fruit buds. This is a principle which it seems to me is valuable for us to study as students, as farmers, all along the line of horticulture and agriculture; that is, the most rapid development, the quickest development we can get, both in the production of trees and in the production of our cereals, and also in the finest development of our young stock. The same holds good right through our live stock interest. We shall find our greatest satisfaction and largest profits in the quickest development of our young live stock upon the farm. The same principle runs right through the trees just the same as it does through the steer, or lamb, or any of the animals on the farm. It is an important lesson for us to study.

Mr. HUTT: Does not early maturity shorten the life of the tree?

Mr. POWELL: That is a question I cannot answer, because I have not put my orchard through that system of bearing yet. Suppose it does shorten the life, we get our profits so much quicker we can afford to shorten the life of the tree. But as I study the question there is a doubt in my mind whether it will or not. It possibly may in the instance of the peach.

Q. Would this early bearing be at the expense of bearing later on?

Mr. POWELL: I think from my study of the question of nutrition, of properly feeding these trees, that we can cover as long a period in this system as we can in the other. My opinion is that it is a question of nutrition; that if we will properly supply these trees with plant food, and keep up this growth of wood and development of fruit beds, it will be a question of nutrition.

Q: Do you keep the same flavor of the Kings on the grafted trees?

Mr. POWELL: I am glad that point came out. While the quality or flavor is, perhaps, not changed, there is no question or doubt in my mind that the period of maturity of fruit is somewhat changed. Now for illustration of that point. The first work done on this principle was done by my father many years ago He grafted the Cayuga Redstreak upon the Early Harvest apple, which we know in New York State to be an exceedingly early apple, coming to bearing with us in the month of August. The result has been by top working the Cayuga Redstreak upon this Early Harvest apple I have been able to ship these apples to Liverpool in the month of August, only a few days later than the Early Harvest apple ripens itself. In the month of August I think I have been almost the only American shipper who has sent that variety to Europe. Now with regard to the top-working of pears on the Keiffer stock. The Keiffer is a late maturing variety, one of the latest possibly, with the exception of winter pears. I have been top-working the Anjou, which is a very superior pear, on the Keifler stock, with the result that the period has been prolonged for maturity of the Anjou pears. When the Anjou pears on their own stock are ready for market those on the Keiffer are not ready until ten days later. So that here seems to be another illustration of the fact that the stock certainly does have some influence on the maturity, early or later, of the scion upon it.

I want in a very few moments to give a few points on the development of strawberries. Small fruit culture is expensive, far more costly than the growing of cereals.

Small fruits are, perhaps, the most expensive of all the productions taken from the soil, and hence it is of the utmost importance that if we enter small fruit culture, and there is a wonderful field in this direction, we understand the principles of the finest and best development of those fruits in order to reach maximum results. During 1898 we started out to demonstrate what could be done in the line of higher development of the strawberry. We have never yet learned the possibilities of intensive culture in any direction; we have never yet learned the possibilities of the soil to produce, and it becomes an interesting field for observation to find out the possibilities or extent of production. Taking an acre and a half of land we put it under a high system of tillage. We pushed the development of the strawberry in 1898 to a very interesting point, so far as the development of the plant was concerned. When we reached the past season, 1899, we were met with conditions unparalleled having to go through the most trying ordeal just when we should have reached full results. The drouth was continuous, and not once did rain fall upon those plants from the time they started to grow until they had passed the fruit season, and so we were cut short in the fulness of the results which we would otherwise have had. But we were able to develop single plants upon the principle which Prof. Hutt has already explained to you. We were able to develop plants during this past year which measured across the diameter of their foliage two feet in any direction. Now the question is, how was it possible to bring up the development of strawberry plants which would measure two feet across in any direction? It was simply by studying the law of development in the plant itself, and an illustration can be given here. In attempting to develop upon the intensive line of culture the strawberry, we must understand the principles which control its growth, the principles which gives the best possible development in bearing plants in order to reach the high results we are aiming at. Now, this plant has two systems of growth; one is the growth of the crown of the parent plant which will be fruit-bearing. It has another system of throwing out branches or runners which if allowed to extend in this direction will take root and reproduce their kind. If we want the finest development of fruit bearing plants we must cut off the runners or lateral plants. If that principle is kept strictly in view the limit is not known to which the production can be carried. It was by this constant cutting away of the runners that we developed these strong crowns which gave this very fine development of plant. It was a pleasure to go through those grounds in the opening of the spring, when the plants were in their fullest vigor, when they had passed through their blossoming period, and be able to count the large number of berries formed on a single plant. Of course the drouth started at the same time, and a comparatively small portion could get through, but it shows the possibilities of development in this connection. On good soil your rows should be planted four feet apart, and not less than two feet distant in the rows. You see with such development of plant as that you must have room for the roots to go out, as they do so largely, and room for the development of the plant itself and for sunshine to get along the plant.

Q.: You only cultivate the one way?

Mr. POWELL: Only the one way. Now, it is along these lines that it seems to me the future promises so much in agricultural development, and we have not entered the field of the best development of agriculture as yet. I was delighted while here in your midst, and especially so in all this splendid array of experimental work which has been carried on among your farmers, to know that you are reaching out along this line of higher development, and it seems to me there is no finer prospect for the young men going out from this College than work along this line of intensive farming.

Dr. JAMES MILLS: I cannot allow the opportunity to pass without expressing the pleasure which this address has given me. It has opened up to my mind an entirely new field. We have looked for these characteristics in cattle, sheep, swine, poultry and so on, but I am inclined to think the majority of us in this Province have not given much attention to the study of individual trees of the same variety, and I can see from what Mr. Powell has said that in this there is a great and important field before us. I have been pleased with his address because I felt from the first that it was being given by a man who understood exactly what he was saying. He has done the work himself. Clear, logical and scholarly, it was a pleasure for me to listen to, and it is a pity to let the opportunity pass without at least a number of questions. I should like to have a word from Mr. Powell as to what he means by intensive cultivation, the cultivation, say, of

those trees until they are two years of age, on which he intends to graft the more valuable varieties. What is the nature and extent of the cultivation and the manner of treatment these trees receive?

Mr. Powell: The subject of tillage will, I think, come in under the talk to-morrow. There is one point, however, which I did not take up this afternoon for fear of encroaching too much on your time, and that is the resistance of the different trees against fungus. For instance, the Baldwin. The question has been asked several times why is it the Baldwin apple has so generally gone down? Why is it in my own State of New York, which a few years ago was everywhere so popular and productive, why is it to-day failing to produce only, perhaps, once in four, five, or six years? The facts are these. The foliage of the Baldwin apple is defective; it is not resistant to the apple scab fungus; it is going down under the disease known as apple scab fungus. That is the reason we are not growing the Baldwin apple as successfully as we did; because of the extension of the planting, and the disease extends with the planting. The wood which I have here shown you comes from a variety known as Southern Beauty, which is very similar to the Baldwin in appearance, size and color, has all the desirable qualities of the Baldwin in every respect, and is even better by fully 50 per cent. in point of fine flavor. The Southern Beauty is resistant against the apple scab fungus. So here comes in the question of the ability of foliage to resist disease, and if we can propagate a variety which has naturally strong resistant power, why there is an immense advantage in developing that variety. How many of you recognize the Spitzenberg apple? Not many. The Spitzenberg presents, perhaps, the finest quality, the choicest flavor. There are English people who recognize the fine quality of that apple and are willing to pay the price for it. The Spitzenberg is becoming extinct because the foliage of that variety is not able to resist the apple scab fungus. So that is another very important study, the resistant power of foliage, and there is as much difference in foliages as in the other classes I have mentioned here.

Mr. Macoun: I am very pleased indeed to have this opportunity of appearing before the Ontario Agricultural Union. I was here only once before, and enjoyed myself very much. I hope I shall have an opportunity of coming very frequently. I was particularly interested in Mr. Powell's address, as we have been carrying on some experiments somewhat in the same direction. I think most of you know that we have a much severer climate at Ottawa than you have in this part of the country. Our winters usually begin about the third week of November, and we have continuous sleighing until some time in March. During that time the thermometer drops quite frequently to twenty below zero, and the trees have a very trying time of it. We have found that many of the better winter varieties will not succeed at Ottawa when grown in the usual way. Such apples as the Northern Spy, Baldwin, King, Red Holland, Greening, Spitzenberg have all failed when grown in the usual way. In 1891 or 1892 Mr. John Craig, the late horticulturist, grafted some Northern Spy on the Wealthy and Duchess apples, and the result is the tops have proved perfectly hardy. We had fruit last year and again this year. We find very frequently that a tree not killed back by winter will kill outright at the root, so that the conclusions we have reached are that, if we can top-graft these trees on hardy stocks it is possible we may produce in considerable quantities such fine apples as Northern Spy and Baldwin. The King seems a little tender at the terminal wood, and I am a little doubtful with regard to it. I was particularly interested in Mr. Powell's address because there are so many orchards in this country which are practically worthless because at the time they were set out there were very few good varieties propagated. It was supposed that only grades would succeed in the northern part of the Province. I would like to add a word of caution as to top-grafting on the Wealthy and Duchess. These apples have been planted extensively in the Province. They begin to bear early and have abundant crops. The difficulty is that they have early fruits and the market is glutted with them. Our experience has been with the Northern Spy; they fruit early on these trees, but the top is getting so heavy I expect in a very few years we shall lose the whole tree. The top will become so heavy that in a big storm it will break right off at the point of union. So that the point to be taken into consideration is to have a very strong-growing stock, and I don't think it will matter so much then whether your top is strong-growing or weak-growing, but if it is the other way ill results will be sure to

follow. We had a striking example of that this year in a European plum which had been grafted on the American plum. There was such a difference in the top and stock that it caused the death of the tree; the sap did not seem to be able to get into the top, and the result was that it died.

Dr. MILLS: Have you given any attention to the question of the trees from which you select your grafts or buds?

Mr. MACOUN: When we are grafting new stock we always make a point of taking scions from trees which have borne the best crop.

Mr. W. HUTT: Can any method be suggested by which trees can be induced to bear? In Welland county we have everything apparently all right, except that they don't bear, and they seem to develop the habit of unfruitfulness.

Mr. POWELL: It is a somewhat difficult question to answer, but if your trees are inclined to a continual growth of wood there must be some check given to that tendency. There are two ways in which it can be done. You can cut the roots, and thereby check the tendency to grow wood. The other way might be to seed the orchard down. I don't like to see an orchard standing in seeding, but if it is growing too much wood it would be better to seed that orchard down rather than keep up cultivation.

Q.—Where you have an orchard of large trees what system of grafting would you pursue?

Mr. POWELL: The regular cleft system is preferable. Take your wood when about an inch in diameter and just insert on the cleft principle. You get a very complete union, and after a few years you cannot see where the cleft is set. You want to take into consideration the form of your tree. Never start trees so that the branches come opposite each other. If you do you are sure to have broken trees, because when they come to bear they will split or break down. Cut off your branches so that there is a space of six or eight inches in the tree in which you insert your graft. There needs to be great care taken in all this principle of grafting. It is only lately I have discovered that you may introduce disease merely by grafting. Suppose it fails to grow. It is of the utmost importance that that scion which fails to grow should be taken out and the wound waxed over so that it shall heal perfectly. I have discovered that the scion which does not grow becomes diseased, and the disease will follow right down to the stock.

Dr. MILLS: In speaking of the Baldwin apple and the fungus, would not spraying help that?

Mr. POWELL: Spraying would help it if done persistently, done thoroughly, and done in time. I think the experience is that half of our spraying loses its benefit by not being done in time. The development of the fungus is far in advance when sprayed. If it was in your orchard last year, it is present there to day—and it is ready to develop on the spurs on which your buds are growing. It is there all ready to spring into life with the first opening of spring. So that we need to do our spraying far in advance of what it usually has been done, and that would be before the foliage appears at all, and about the time the buds begin to swell or the first indications of life come to them in the spring. I think it can be controlled by the Bordeaux mixture if the syraying is done early in the spring.

W. J. BROWN: There is one subject in which I am very greatly interested and which has not been touched upon—that is, the question of wind-breaks for orchards. I noticed in travelling through the counties in the west during the last fall that the large percentage of orchards which had crops worth harvesting had a wind-break, and I came to the conclusion that if I expected to have crops worth harvesting on my own farm it was necessary to have a wind-break, and I would like some information on that point, the distance apart and how they should be cultivated.

Mr. POWELL: I have been working on the principle of wind-breaks for a number of years, and have followed the practice to grow lines of trees on the windward side. In my own section of the country we get slopes to the north, southeast and west. When an orchard is planted my practice is to plant a line of trees where the wind strikes heaviest, and I have planted the Norway spruce and white pine, the two principal varieties. The Norway spruce is a rapid grower. They are planted usually 15 feet apart, and then as they grow up and interlace too heavily every other tree is cut out. A wind-

break should not be made solid, for the reason that we need passages for the air to circulate, because wherever there is free circulation of air there is less danger from frost and there is less hard freezing. The trees should admit of free circulation in narrow spaces at least. The Norway spruce will grow to a height of 50 feet within a period of 16 or 17 years. That, of course, is a very rapid growing tree, and considered a very valuable tree for that purpose. It is massive and heavy, and by separating occasionally the wind can pass through and break up the heavy, bad, condition of the air which is always dangerous in the spring when your trees are in bloom. Great losses have followed solid wind-breaks. I believe in wind-breaks. Their value is to protect your trees from the heavy force of the wind, and also protect your fruit from blowing off. The white pine and Norway spruce are the most valuable trees I know of. I have also planted the maple and the American elm for ornamental purposes and also to form a wind-break.

Mr. MACOUN: I would like to ask Mr. Powell's opinion of the low trunk for apples. After some years I have found that our healthiest trees are those having a low trunk two or three feet above the ground.

Mr. POWELL: That is a very important thing when you are troubled with snow squalls. I believe in thorough tillage and starting your trees a little higher, because we do not have quite as much trouble from snow squalls as you have here. In the Southern States they have the head low for the same reason, although the climate is milder. So for your purpose I should say low-headed trees by all means.

H. L. BECKETT: With regard to top-grafting. Some have trees of 25 or 30 years' growth. What is the largest sized limit you would consider advisable for top-grafting? Also, it is a practice with some to leave both sides, where both sides grow, to come into bearing. How many years do you think it advisable to leave them before cutting out?

Mr. POWELL: I should say on old trees you could set scions on branches at least three inches in diameter; that is a pretty large limb. I would cut across and put in four scions. Wax very heavily in this case, and let all grow for at least three or four years. When your four scions begin to close up with branches, if the growth has nicely covered it all over, then I would cut out according as it would balance that tree best. The next year I would cut another scion out. That would be healing over, and then if your other two are still growing cut a third the next season. In that way you can cut a large limb and heal it over by the growth of your four scions, and you will get a very good tree in that way. Begin at the top of the tree. If you have a tree 15 or 20 years standing, begin at the top, and only come down about one quarter the first year. Cut your top branches right out. Take out the side branches and set your scions. Then the next year go still lower down. Cut off your heavier branches, which would be three or four inches in diameter, and insert your scions. In that way you would change a good portion of the whole of the top of your tree. When you come to the lower portion you will have to leave them as they are. With regard to the second part of your question, I would let the scions grow in young trees until they come together.

Dr. MILLS: Do you approve of white-washing trees?

Mr. POWELL: Not for the purpose for which it is done. White-washing has been considered a means of improving the bark of the tree. My practice now is to spray trees with lime in order to destroy certain kinds of insects. I think the value in the use of the lime is in keeping down certain kinds of scales. I would not go over it with a brush, but would apply the spray. So far as the lime is concerned it is of no special benefit to to the tree itself. I would prefer not to have lime upon it, but I think it is useful in destroying certain insects.

Dr. MILLS: When do you apply it?

Mr. POWELL: I am just working now upon the pear trees. I have a suggestion since coming here from one of the members of your Ontario Fruit Growers' Association which may be of great importance to me, of controlling the pear sylla by a lime spray. I stand at present a loss of 700 to 800 pear trees out of 1,000 by a very minute insect called pear sylla. I have a hope in hearing the experience of one man who sprayed his trees with lime, and he thinks in that way has controlled the insect. So I shall lime my trees in February. For scale insects along about April would be the time to spray to destroy the scale.

Q. : In treating pear sylla what do you use?

Mr. Powell: The eggs are deposited along the branches and at the base of the leaf buds and fruit buds, and as soon as the sylla is hatched it settles along the axils of the leaves and fruit, and over the foliage, then runs down the branches, and so virtually destroys the tree. The trouble is to get at that minute little thing and destroy it. It is so embodied in the honey dew that it protects itself. The moment you can touch the insect with the least particle of kerosene emulsion or coal oil you kill it, but the trouble is to reach it.

Q: In 1896 we treated with kerosene emulsion, and we have not been troubled further. We treated in May and June.

Mr. Macoun: Yesterday afternoon at the Fruit Growers' Association at Whitby I had the pleasure of presenting a paper on some results of spraying with white-wash at the Experimental Farm last winter. Probably most of the students have read Bulletin No. 38, by Prof. J. C. Whitten, of Missouri Agricultural College, in which he tells his experience in trying to keep the peach buds dormant during the late winter months and early spring. He found by covering the trees with white-wash he was able to keep the buds dormant during days when the temperature was comparatively high. His theory was that a white surface would not absorb the sun's rays as much as any other color. Of course that is a point every one knows quite well, and he wished to see if it would apply to the peach, preventing the swelling of the buds. He bored out some branches of the tree, and inserted thermometers. He found that there was a difference of from 10 to 20 degrees in temperature where there was a white surface. That is, the temperature was 20 degrees lower than where the natural timber was exposed. In trying to prove these experiments of Prof. Whitten's at the Experimental Farm last winter I ran across, I think, a very successful remedy for the oyster shell bark-louse. When the white-wash came off the trees this summer I was very much surprised to find them perfectly clean. We might find 5 or 10 scales on a tree 12 years old. Before, our trees were very slightly to badly affected by the oyster shell bark-louse. What was my surprise to find that the trees were perfectly clean; the bark was of a much healthier appearance and it seemed to make the trees more vigorous during the summer. It seems to me this is very important, and I have started a series of experiments this time to confirm my experience of last winter and find out how much white-wash it takes to kill the insect. My method is to keep the trees perfectly white from February until the latter part of April, and I want to find out how many sprayings it will take. It is possible that it is the smothering of the insect that kills it, and I am very anxious to find out just how much to apply. So what I have done is to treat certain trees with one application, certain trees with two applications, others with three and four applications, and I shall probably carry it up to six. This I started last month and shall probably keep it up till next May. I may say that I am going to St. Catharines to-night to try and arrange some experiments there to treat the San Jose scale in this way, because I cannot see why, if the oyster shell bark louse is killed, the San Jose scale cannot be killed also.

Dr. Mills—Is it simply a solution of quick lime.

Mr. Macoun—We take the fresh lime and slack it in warm water, and our mixture was made up of 6 gallons skim milk, 24 gallons water, 60 pounds of lime. Two pounds of lime to the gallon of water. It was strained through a twelfth of an inch mesh. It makes very thick white-wash.

Q.—Why do you use milk?

Mr. Macoun—It makes it stick better, and I believe salt makes it stick better still.

REPORT OF EXPERIMENTS ON SOIL MOISTURE.

Prof. J. B. Reynolds, Director of Experiments in Soil Physics, Agricultural College, Guelph.

Only one successful experiment was conducted, by Mr. H. R. Ross of Gilead. The purpose of the experiment was to examine the effect of various methods of treating the land after seeding. Six plots were sown, three of oats and three of barley. One plot of

each was rolled immediately after sowing; another was rolled and then harrowed; and the third was not touched after the drilling was done.

They were sown on May 5th, and on the same day a sample of soil was taken from each plot for moisture-determination. Samples were taken again on July 3rd, and again on the days when the grain was cut, July 28th for the barley, and August 5th for the oats.

Early germination. On May 12th, one week after sowing, a count was made on each plot for sprouts, within a given length on a drill row. Two days after another count was made in a similar way.

Yield. The crops from the various plots were kept separate and threshed separately, and the yield of each calculated in bushels per acre. The results of all these determinations are given in the table below.

	Treatment.	Oats.						Barley.					
		Drilled.		Drilled and Rolled.		D., R. and Harrowed.		D.		D. & R.		D., R. & H.	
		1st foot.	2nd foot.	1st foot.	2nd foot.	1st foot.	2nd foot.	1s foot.	2nd foot.	1st foot.	2nd foot.	1st foot.	2nd foot.
Per cent. of Moisture.	May 5	24.3	23.5	24.2	24.8	23.5	24.0	24.3	25.5	26.7	24 1	26.4	25.5
	July 3	19.9	21.3	16.0	23.0	20.5	19.5	18.8	21.0	20.7	20.6	19.1	22.5
	July 28	.....	.....	.....	.....	.....	.....	13 7	17.9	15.5	15.6	12.0	17.4
	Aug. 5	16.2	19.4	13.0	19.2	15.8	19.5	.....	.....	.....	.....	.....	.....
No. of Sprouts.	May 12	21		17		26		25		19		27	
	May 14	27		25		27		41		38		36	
Yield		51		49		55		24		23		26	

Conclusions: In both kinds of grain, the complete treatment, that is, the drilling, rolling and harrowing, gave the best yield and the drilling and rolling the lowest yield. Comparing drilling simply with drilling, rolling and harrowing, the latter treatment increases the yield in both cases by 8 per cent. Comparing drilling and rolling with drilling, rolling and harrowing, the latter, that is, merely harrowing in addition to the former treatment, increases the yield in both cases by 12 per cent.

The causes for the increased yield are apparently two: First, leaving the land rolled without loosening the surface afterward seems to retard germination. In 9 days the number of sprouts in the plots under the different methods was practically the same, but in 7 days there was a difference of 50 per cent. in favor of harrowing after rolling. The germination in the plots that were rolled was therefore slower. Secondly, the texture of the land was injured by the rolling. The soil under experiment was a heavy clay, and the rolling puddled it more or less. As regards the moisture, in the oat plots the harrowing seemed to conserve the moisture, while in the barley the harrowed plot contained less moisture in the last two determinations. But it must be borne in mind that moisture determinations made on land that is growing crops are uncertain and inconclusive. For if one plot has more moisture than another, it will produce a larger crop, which crop will in turn demand more moisture to sustain it, so that the plot that began with more moisture as the result of better treatment or for other causes will likely at the end of the season have less moisture than the worst treated plot. At any rate, since the moisture is only a means to an end, and the crop the end sought, the fact that the one method of treatment gives a much larger crop is the fact that we wish to emphasize.

THE PHILOSOPHY OF SOIL TILLAGE.

George T. Powell, Ghent, N. Y.

The subject for discussion this afternoon is the Philosophy of Tillage. I do think it is one of the most important subjects we can study. The science of agriculture depends on understanding the principles which underlie tillage, and it does become of great importance for us to understand as much as we can of the subject. If the question is asked the average audience of farmers, what is the objection of tillage? I notice many give the reply, to destroy weeds; others say to properly prepare a seed bed; and yet if we were to take the first reply—to destroy weeds—I think we should find our soil would lack very much in the process of tillage, if we tilled from that standpoint. So we may be thankful that weeds have been sent to occupy our soil and force many farmers to destroy them, where that is their understanding of tillage. As I understand it, the main object of tillage is to make available the plant food which is in the soil, that the seed which is planted there may may find what it needs for its support. So I look upon tillage in its fullest sense as the supreme effort to obtain the liberal supply of plant food which our plants must have. I cannot look upon our soil as by any means exhausted of plant food. We hear the statement so often made that one of the reasons for the small and low compensation in farming to-day is that our soil is exhausted. I do not believe it. I believe our soil to-day is abundantly supplied with plant food, sufficient to meet the wants of generation after generation yet to come, but it is the question for future generations, it is the question for the present generation, to know how to get at the plant food which is still abundantly stored in our soil. And so I look upon tillage in its most important sense as getting still further at plant food. As we look back over the history of our country we recognize that the soil has been abundantly blessed with wealth. We see as the result of the taking out of this plant food from the soil the splendid conditions which are about us to-day in the farm lands, the improvements which have been brought to those lands, in the excellent buildings, in the good condition of fences, in much of the under-draining which has been done, in the comforts which have been brought about the farmer himself, in the liberal education which he has been able to give to his children. All this is representative of what the soil has been doing. It is the wealth of the soil which has enabled farmers to bring about the present condition of improvement which we recognize, and bring to their families comfortable living and the advantages of a liberal education. Now, the great problem of the future is, how can we continue to obtain these blessings? How can we go on and make still further improvements? How can we send more boys to college? Not one, but two or three perhaps. That is the question, and the soil must answer the question in every instance, because the soil is the farmer's bank. He must draw upon his soil for his resources, and tillage comes in here as a very important factor in his operations to enable him to obtain wealth from the soil. Then we need to understand the philosophy of tillage; we need first to understand the implements. We need to very carefully understand the principles upon which plows are constructed. We have, perhaps, not thought enough on this question of the construction of plows. I know in my own experience, in meeting with farmers and the manufacturers of agricultural implements, that one of the claims which to-day are put forth more than ever, is that the plow will go through the soil with the easiest possible draught. Sometime ago I had an interview with a couple of implement agents. One of them said that his plow was so perfectly constructed that, when properly adjusted or set, it would run a certain distance through the soil without any one holding the handles. The other agent said he could not make such a claim as that. So the two plows we set to work, and we followed them about the field. The one did exactly as the agent said; when it was properly adjusted it would start and run and turn the sward up for quite a distance without throwing out of the ground. The other plow wouldn't go half the distance. Now, when they had been running for sometime we examined carefully the condition of the soil, and the difference in the condition of that soil was very marked indeed. Having made up by mind with regard to the two plows, I said to the men working them, "Which of the two do you prefer?" They replied, "We like this easy running plow." I said "That is just the plow I don't like." Then came the reasons for it. The easily driven plow merely ran through the sward and spread it and turned it with the least

possible resistance. The plowing had a fine appearance, as far as plowing might be considered from that standpoint. The other plow left the soil in a very different condition. From the moment it started into the sward the operation was different. It was continually breaking and twisting and grinding that soil every moment it was working, and that was the plow doing the best work altogether. A little harder on the team, on the man holding it, but it in its turn was accomplishing just what we want in a plow; that is, was reducing the soil and putting it in the mechanical condition by which plant food is going to be made more valuable. The first process of tillage should start with the plow itself. It is not this very finely constructed plow which will simply glide through the soil and turn the furrows with the least resistance which is best, because that is not doing what we want done with the soil. We need to study the construction of mouldboards and landsides, that when we purchase a plow we may understand that that plow is going to reduce and refine and pulverize the soil every moment it is working. That is my understanding of a good plow. It is not the easy draught, the light running plow, but it is the one which is the most thoroughly manipulating and reducing this soil to the finest possible condition while it is passing through.

Now the next point would be in the implements which follow. Every implement which follows the plow should work upon this principle of passing through the soil and reducing and grinding and pulverizing it; in other words, liberating the plant food. And so we should study the construction of cultivators that will do the work the most completely and thoroughly every hour we are working with them. With our soil well supplied, as it is at the present time, with the necessary elements of plant food, not so available, perhaps, as half a century ago, still, if we understand that our soil is abundantly supplied, as it is, then we shall understand the philosophy and the real object of tillage. That it is simply to get at this plant food, and that it is more economical for us to get at that which we have under our feet than it is to put our hands in our pockets and take out hard earned dollars to purchase commercial plant food. The real object of tillage is that, before we spend one dollar on artificial plant food, we use what is under us in abundance. I think I will not dwell longer on the real underlying principle of tillage; I trust I have made that point clear to you already.

The next point which seems to me of importance is that which has been discussed by Prof. Reynolds—that is, the control of moisture. I think the lesson which was given by that gentleman is of very vital importance. We do need to understand so much about the control of the moisture. It is a fact that were we to depend on the annual rainfall—that is, upon the rainfall during the growing season—we should certainly fail in the large majority of fields we are cultivating, because we do not have during the growing season nearly enough rainfall to carry our crops through. We have to depend on the moisture which is stored up in the soil during the previous months for the growth of vegetation. Our main dependence lies in the amount of water which is available in our sub-soil. So I look on tillage in its secondary importance as really working to conserve and utilize in the best manner the moisture which is in our sub-soil. Tillage should be carried on in the second instance with reference to supplying the deficiency that in nine times out of ten will come to us in the growing of our crops. This is done, as has been clearly explained by Prof. Reynolds, in the methods which have been pursued here in your experimental work, by so handling the surface tillage that you can conserve and hold back the moisture which is taken from the sub-soil. Now it is an exceedingly interesting study, to those who observe closely and carefully, to note the action of the sub-soil conservation of water. You who have cultivated open fields will recognize this, that were the rolling has not been done, when you have finished your field, and if there should come a dry period immediately following the seeding, you will notice that in the morning where the horses' feet have pressed the soil you can see the moist places across the field following the footsteps of the horse. And so you have done by the horse exactly what the roller has done; you have compacted your soil and made it possible for the sub-soil water to come to the surface. These are the things which pay the farmer, and particularly the young man, to observe closely and note the effect of the action upon this soil by the tramping of the horses' feet, and it gives him the suggestion that he must save that for future use, and not have it pass off without benefiting by it. It is a very difficult thing to explain this action of the water on the soil. Of course we study to learn about capillary action, but who can

explain what that is? The scientific man becomes interested in the study, but what is capillary attraction? What is the power and influence which is constantly forcing water upwards in the soil? It is a difficult thing to explain, yet we have studied for many years about the principles of capillary action. If we could take a cube right out of the sub-soil we should find some exceedingly interestings things; if we could only watch the movement of the water in the soil; if we could only look into it, and there could watch and see this movement of water, which is not always upward, but which is in all directions until it finally reaches the surface of the soil, we should see some exceedingly interesting things, but after all difficult to explain. We know it to be a fact that there is a constant seeking of the water to escape, and this is particularly true as the temperature becomes heated. Tillage should be with a view to holding back this supply and conserving and utilizing it to the best possible advantage in the growth of our plants. This is where frequent surface tillage comes in, and as the hot days increase the surface tillage should be more frequent. The effect, of course, is to cut off this escaping water which is constantly pressing to the surface and passing off by means of evaporation. Now, by the constant and frequent movement of the soil on the surface we seal, as it were, the water below, and here comes in the value of understanding the action of water in sub-soil, that we may utilize it through the medium of our plants in passing off by evaporation into the atmosphere.

Now, to apply this to the farm. I will take for illustration the orchard, and apply this principle to trees. We have had an illustration of the oats and barley, and we will carry it now to the field in which the trees are planted. Suppose we have here in the orchard trees of any kind, apples, pears, plums or peaches, and their roots are all through the soil—they are extending in every possible direction. If we can understand this principle of the upward movement of the water and tendency to evaporate rapidly as the warm days increase, we shall understand the necessity of tilling the orchard; we want to hold it in reserve for the roots of trees, the same as of plants. So tillage is as vitally important for the control of the water in the soil as it is for getting at the plant food. In fact, we cannot get at the plant food in the soil for use in those trees until we have the water there to work with us. It is through the action of water upon the potash, upon the phosphoric acid and nitrogen in the soil that we get its preparation properly for sustaining all plant life. And when we understand that principle, and apprehend in its fullness the value of water to utilize the plant food, then we shall understand the real and true philosophy of tillage. Prof. King, I think it is, who has given us this illustration in his calculations. That an ordinary elm tree of 25 or 30 years growth will eliminate from the soil in a single twelve hours not less than seven and three-quarter tons of water; that is, an elm tree with all its foliage upon it will draw up and pass off through the agency of its foliage not less than seven and three-quarter tons of water in twelve hours. Now just look at the wonderful amount of water which is utilized by a single tree like the elm. I think he also makes this further calculation. That one acre of meadow grass will take out of the soil in water 106 tons in every twenty-four hours of the dry time. Just look at it for a moment, and comprehend the statement. That in every twenty-four hours of dry time in June, when the grasses are in active growth, they will eliminate from each acre of soil 106 tons of water. You will see from this that it is utterly impossible to depend on the rainfall to keep our meadow grass thriving during the dry season of its growth, and how great is the supply of water in the sub-soil when one acre of meadow grass will eliminate 106 tons in twenty-four hours. It is important that in all our methods of tillage, in orchards and in fields of grass, we get this surface in a condition to prevent the passing off of moisture except through the plants we want. In the grain field and in the potato field, and in all our cultivated crops, how important it becomes that the soil be kept clean and free from weeds, because they are there as hundreds of thousands of pumps, pumping up the water and passing it off through the atmosphere. Here is where tillage is valuable in the destruction of weeds, that it shall prevent the robbing of other plants of the water which they require. I want to give you a practical illustration direct from my own farm. We have been suffering for a number of years from long protracted drouths; they seem to have become the rule of late years either earlier or later in the season, and so for a number of years I have been working on the principle of expectancy of dry condi-

tions, and have planned for it in the spring time especially. I want to speak of the importance of early tillage and the value of conserving the moisture from early in the season. This movement of water in the soil begins far earlier in the spring time than we realize. One week's delay in stirring the soil may cause us the loss of hundreds of tons of water, and thus the importance of turning it over on the surface just as soon as the soil is in a condition to work, and holding in the water which is beginning to move on the approach of spring days, I think it is safe to say that the difference in one week has made a loss of over 200 tons of water per acre, in land that was plowed at one period and another piece left unplowed. The loss of 200 tons of water per acre in the spring time may make the difference of success or failure with the crop being cultivated for the season. How can we aid our soil in the holding and conserving of water? On my own farm I have been using clover for several years as a special means of holding in check a very large quantity of water during the season. In addition to tillage, I have been for a number of seasons utilizing the clover plant, in this instance the crimson clover, and I will be glad to give you my special reasons for using crimson clover.

In the first place, we start very early in the season. We begin as early in April as the ground has settled sufficiently to put the teams and plows upon it, and keep it up continuously in our orchards, and also in our potato and turnip fields; we push our tillage actively until the maturing of these crops. This constant use of implements has left the soil in a condition which, if left in that condition for the rest of the season, is going to be most disastrous to the soil. If you have tilled to the extent I have described this afternoon, in the following months of rainfall that soil is going to lose heavily; it is just in condition to be drenched and soaked, and to have its nutrients wasted out to a great extent. We must provide against that loss. We can save the after loss by putting on a cover crop; and the special value of cover crops has been very carefully studied by your own station and College, and by almost all the stations and colleges in our country to-day. Taken in connection with high tillage, the subject of cover crops becomes a very vital and important one. I have been using crimson clover for this reason. We push tillage right through our orchards in New York State up to the middle of July. By that time we have the supposed growth of our trees; we have the development of our fruit buds for the following season, and then tillage should cease. Now, at this point we want to cover the soil with a crop which will protect it during the balance of the autumn and winter seasons. The crimson clover being an annual plant grows more rapidly than any other within a given space of time. The red clover is just as valuable but is slower in its growth, and hence in New York State we cannot get so complete a covering on our fields during autumn by red clover as we can with crimson. It may not be suited to your soil and climate here in Canada, but other crops can be used in place of it.

Now, as to the results of this system of clover culture. While conducting a series of Horticultural Schools in New York State for Cornell University, one of the chemists of the University was with me as an assistant, and in listening to the discussion on tillage and the use of clover the chemist put this question to me one day, "Do you know what you have been doing in your soil?" and I said "No, only in a general way. Not being a chemist, not being a scientific man, I have no way of determining only in the general results." Then he said, "Give me two samples of your soil, one in which you have been following this system of clover treatment with high tillage, and another sample of soil where the tillage has been carried on without the aid of clover, and I will try to determine what you have been doing." We cultivate in our orchards but six inches deep, and so soil to the depth of six inches was taken in order to get at what had been going on with the use of this clover, and the following was the result:—

	Three crops clover.		No. clover.	
Water	15.00	per cent	8.75	per cent.
Nitrogen	.21	"	.12	"
Humus	2 94	"	1.91	"
Phosphoric Acid available	.015	"	.008	"

Following on this line of figures the following is a further explanation:—

Water	6.25 = 46875 tons.
Nitrogen	.09 = 1350 lbs.
Phos. Acid	.007 = 105 lbs.

Now the surprising point was in the results which he found in nitrogen. I need not spend time this afternoon in explaining this, because you, as students, understand the philosophy of the leguminous plant and its ability to add nitrogen to the soil. Taking the least price for which nitrogen could have been obtained it would have cost me $250 per acre to put the nitrogen there which the chemist found had been put there by the planting of thé covering. Now, another very important point is that no matter how much nitrogen had been added, no matter how much available phosphoric acid had been found in the soil, and no matter how much potash, if the water had not been there to work on these elements it would have done my plants and trees very little good.

It comes to me as a new inspiration in farming to think that it is possible for us to go on and push cultivation to the extent to which I have explained this afternoon, and get the increased production at the end of all these processes. After having taken all this production from our soil it is richer when we get through than when we begin. That is the inspiration that comes to us in the possibility which lies before us in the use of tillage, and by the incorporation of these leguminous plants, to leave the soil generations beyond to-day better than it is at the present time. I want to say in conclusion that the future has so much of promise to young men who will take up the practice of tillage and agriculture from the standpoint of scientific discovery. I do believe that in the matter of tillage we have hardly yet learned the first lessons of importance, and in proportion as we discover and apply these important principles we are going to lift agriculture to a higher and higher degree of perfection.

DR. MILLS: You say your cultivation is continuous from the time you get on the ground in the spring until July. What do you mean by continuous cultivation?

MR. POWELL: For instance, we start in the apple orchard. We will plow that orchard. Just as soon as we can get on to the soil in the spring we will plow very lightly. Suppose we have clover on this ground bed, we put the plow in just about 4 inches deep, in young orchards 6 inches. Then we try to cultivate once a week with a cultivator. We use the spring tooth cultivator. We do our deepest cultivation early in the spring. When the weather becomes dry we put on the leveller.

DR. MILLS: Do you attempt to clean up around the trees at all?

MR. POWELL: We go as close as we can reasonably, going in both directions. We usually get pretty close.

DR. MILLS: Plow to the trees and away from them?

MR. POWELL: We plow to the trees one year and away the next. That keeps the ground level.

DR. MILLS: Do you cross plow much?

MR. POWELL: We plow one direction one year and the other direction the next year. We keep our ground level in both directions.

Q — How is it that we used to grow good crops and didn't give it half the cultivation, and we had from 25 to 30 bushels of spring wheat to the acre on the farm I live on, say ten or twelve years ago, and now have only been able to raise six or seven acres of straw?

MR. POWELL: Without, of course, being able to go upon the land and examine it, it seems to me that there may be two or three causes ascribed. First, I think the mechanical condition of our soil is not the same as it was half a century ago. Secondly, when the mechanical condition of our soil is not right from various causes, such as continuous cropping, or perhaps the solidifying for want of a sufficient amount of humus, the water action of the soil becomes difficult. Plant food may be there, but not available. I have no doubt in my own mind that there are a great many acres in your country as well as in my own that would be greatly improved by the use of lime. We begin to realize in New York State that the action of lime is very important on land where we did not think it was at all needed, and I think that next to under-draining the use of lime may be a subject for special investigation in many sections of the country where it was supposed no lime whatever was needed. To give you an illustration. On my own place to-day I find absolute failure for certain varieties of cherries to grow, the Black Tartarian, one of the choicest of all varieties, and another variety which used to flourish years ago, to-day if I plant the trees they die in that same soil. The soil is apparently in better condition than when my father raised cherries, but with all my system of til-

lage and use of clover and the best intelligence I can bring to its management, those trees die on the same soil on which they used to flourish. What is the reason? On the sandy soil of Rhode Island, where it was not supposed they could get any favorable action from lime, they find it is what the soil needs to-day. And I was pleased while at their College this last summer to go out on a sandy plain around the College, and find Black Tartarian flourishing, and on another strip where lime was not used it was dying. So I should say in a general way, investigate and experiment. I would put some lime upon your corn, potatoes, grasses, and see if there may not be a favorable result. By becoming an experimenter, you will help yourself and the Experimental Union. With regard to new land, I think we have lost immensely by the destruction of our forests.

G. E. Day—I am sure that with myself you have all been delighted with the able and practical address which has just been given. It seems to me that the ground has been thoroughly covered and there is very little room for discussion on many of these points. I would just like to say with regard to soil moisture that our practice here regarding rolling has been to postpone the rolling until after all the seeding was completed, and by that time a good deal of the grain has germinated; in fact most of the grain is above ground when the rolling is performed, and we have not practiced harrowing after the rolling because our crops are sown with clover, so that harrowing would be impossible. With regard to the question of tillage, it seems to me that an extremely important point was made by the last speaker in emphasizing the importance of making use of what plant food we have before spending money in buying other fertilizers. People throughout the country are spending thousands of dollars in commercial fertilizers and things of that kind, and entirely overlooking immense stores under their own feet; and the question of tillage is of extreme importance right along that line. In connection with this question of humus—and I believe that we are looked upon at this station as "humus cranks"—the trouble is in a great many farms that the humus has been distributed through rather too much soil, and right there comes in this question of depth of plowing. I was very much pleased, indeed, to hear what the last speaker had to say with regard to depth of plowing. He said they plowed about four inches deep. People will say, "Look at Great Britain, which is noted for its deep plowing; and in Germany, where agriculture has been brought to a high degree of perfection, they plow some 16 or 18 inches deep." This may seem somewhat contradictory to what we advocate here, and yet I do not think that such examples furnish anything like a criterion for our guidance, for the reason that where very deep cultivation is practiced extremely large quantities of fertilizers are supplied—very much larger quantities than are available to the average Ontario farmer. The trouble in this country is the large tracts of land which we cultivate. The amount of stock we keep does not permit us to cover that land sufficiently frequently, and consequently if we dilute the amount of humus we put on the land with a large amount of soil we are destroying the effect; and as the fertilizers which supply humus are comparatively limited, we believe that humus should be concentrated where it will do the most good, which is near the surface.

W. N. Hutt—I would like to ask Mr. Powell if he does any cropping in a young orchard or to what extend?

Mr. Powell—In planting a piece of ground to a young orchard it is a question with many who have not capital, how can they get a quick return from that soil? And very many, not having enough money to start with, have to purchase land and incur indebtedness upon it, and this becomes a very vital question to such. I advocate the cropping of land in young orchards under certain conditions. For instance, if you have a market for small fruits I put small fruits in the space. I plant currants. I would start the first rows of currants seven feet away from those trees. Plant nothing nearer than seven feet. You can keep up your tillage, you can improve the soil all the time the trees are growing. Then with the currant or strawberry culture you can afford to put some money on a crop which is to bring you a return next year. Feed each crop with commercial or artificial plant food, and so long as they are there the soil is kept improving around those trees. Now, if you are not situated to grow the small fruits, then the question is can you grow your potatoes in a small orchard? I think you can if you follow the same practice; if you feed the crop with plant food you can crop the soil for at least three or four years. By following the clover culture you keep up the condition of your soil, that is, you are not robbing it of its essential element, nitrogen; you are re-incorporating lost

humus by clover or peas, and so keep the soil up to a high condition of productiveness, and at the same time taking off those crops. As soon as the orchard comes into bearing then remove everything but the trees themselves.

Q.—What is the proper depth to which under-training is profitable?

Mr. Powell—That would depend on the character of your soil, the tenacity of your sub-soil, whether hard clay or more open and porous. If your soil is clay you do not need to go quite so deep; you want to get that surface water away rapidly from a clay soil. If you have an open porous soil let your ditches go a little deeper, because you can bring back again your supply to the surface.

CELEBRATION OF THE QUARTER CENTURY ANNIVERSARY

Of the Ontario Agricultural College and Experimental Farm.

The following address of welcome to ex-officers and ex-students was given by Dr. A. E. Shuttleworth, Ontario Agricultural College.

To the ex-officers and ex-students :—

The occasion is one which does net call for a long and full speech, but at the same time it is an occasion of great responsibility; it is an occasion which deserves very warm appreciation. The ties which are formed at College are warm, are peculiar; they are not easily broken. It matters not how you may change your position, how far one may be from the other, it matters not what may come to alter the manners and thoughts of either, if there has been formed a tie of warm friendship at College that tie is never broken, that friendship is never forgotten. Twenty-five years have rolled by since the opening of this College, and this long time has certainly resulted in forming many warm ties and friendships. We have students with us who belong to the first year of the history of the College, and no doubt students belonging to all the other years. Think of the number who have met here and the pleasure there is in renewing these friendships. I say it is a responsibility to be asked to give expression to these sentiments which should fill the hearts of us all on an occasion like this. No one knows, except those who have actually experienced it, how enjoyable a meeting of this kind is for those young men who have been far away for many years. In speaking upon this occasion I have to consider a great many people. Some 1,600 or 1,700 ex-students have their names on our books; same thirty ex-officers also are to be remembered. We find that of those 1,600 or 1,700 ex-students some 1,000 have responded to the letters of our Secretary. I would fall far short of my duty if I were to simply speak of the joy and happiness we all experience in coming here, and forget to say that many of our brightest young men, many of our medallists, have passed away as the years have rolled by. Some of our ex-officers have also passed away, and some so lately that their faces and places are familiar to most of us gathered here. This is a dark spot in the happiness we enjoy to-night, but it relieves that darkness to remember with pleasure the memory of those who have passed away. It is not too much to say that our students are becoming more and more appreciated in the counties in which they live. It is only a few days since I was in the counties of Welland and Haldimand, where a well educated farmer came to me and said, "We are proud of your boys down here; they are doing us good." I say our young men are becoming more and more appreciated in the counties in which they live because they have real worth—worth of education, and that is of great value in a country place. I do not wish to say a word against the hard working farmer of the country, but we have many farmers, good honest men, who have not had the advantages our young men now have. When I say "worth of education" I mean an education that is of practical use, whatever else it may be. So you have real worth in education, in character, in industry, and in something else, in politeness. As students of this College let us not forget, while we are engaged in the calling in which we love, that virtue which is spoken of as gentleness and politeness. Further, our young men are appreciated in the counties in which they live because they are enterprising. I have met farmers who, being surrounded by farmers much less enterprising, have been held back.

Ex-students and College graduates, who number now a great many, I think owe something to this College. I am sure there is not one who will rise and say he owes nothing to this College. We, and I am speaking now of the College, cannot afford to be independent of the people of our country. We, as a College, require backing, require sympathy, require encouragement. We get sympathy, we get assistance of a very substantial kind from our ex-students scattered here and there all over the country. So that the College and the ex-students are of a mutual benefit to one another, and the time will not be long, I do not think another quarter of a century will roll by, before our young men, to whom I am now addressing a few words of welcome, will number so many that their influence will extend far beyond the counties in which they live. It is beginning to extend to political matters. I do no mean as members of parliament, that will come in the natural course of events, but your influence as farmers in the Province will extend from county to Province, from Province to Dominion, until we as a College feel that our great backing comes from our graduates themselves, and that is the very best backing any college can have. I speak these words of welcome on behalf of those at the College to our ex-students and our ex-officers, and I am sure that upon this occasion you will appreciate the sentiment of the poet expressed in the words,

"Thus we salute thee with our early song,
And welcome thee, and wish thee long.

RESPONSE ON BEHALF OF EX-STUDENTS.

By Nelson Monteith, B. S. A., M. P. P.

The occasion upon which we have met here to-night is one which touches a responsive chord in the heart of almost every ex-student and student, the Annual Re-Union; and I am pleased that as years go by it is looked forward to even more and more as an occasion of rejoicing, I am pleased to-night that we have such a very large student and ex-student body. With regard to the vastness of the freshman class, it has outgrown former years entirely, and I only regret that the percentage is yet so small. I hope in years to come greater accommodation will be provided for the education of farmers. On being asked to respond on behalf of the ex-students the thought has come to me of the vastness of the constituency which I represent—it is world-wide. We inherit this British instinct of adventure which has sent forth British mankind wherever they exist, and I respond to-night for men in every clime; our students have gone to better themselves in every land, and I know I only voice the sentiment of those ex-students when I say that that spirit animates almost every one of them. I feel that the memory of days spent here and the lessons learned will help in their lives. With regard to what a previous speaker has said as to the number of ex-students who have gone back to agriculture, the percentage does not seem very large, but when you compare it with other seats of learning, such as the High Schools, the result is very much in our favour. Only the other day I was looking through a report of the Department of Education, and it does not make the showing of this College in regard to sending men back to the farm. Almost 75 per cent. of our students have gone back to agriculture. whereas of the graduates of High Schools in that report, though over one-half came from the farm, less than one-quarter went back to the farm. We must look largely to the Ontario Agricultural College to right this matter; and I trust, as I said before, that ample accommodation may be made for the number who wish to study agriculture. I may say in conclusion that we appreciate the remarks made by Dr. Shuttleworth. We feel and we respond to the sentiments expressed in his address. I trust that every student on going out from the College will feel it his duty to maintain the honor of the institution. It is a broad sentiment which has been taught us here, and I trust we shall carry it into our private life, and do the very best circumstances will permit us to do, and if we put the right amount of energy into it, in this young and growing country, we have, I may say, the matter in our own hands. I thank you on behalf of the ex-students for the kindly reception you have given me and have ever given to us at this Annual Re-Union, and I trust that we shall come up annually to be reinforced and re-strengthened for the year.

RESPONSE ON BEHALF OF STUDENTS.

Mr. E. C. Drury, Student, Ont. Agric. Coll.

A minnow, carried by the tide far from the quiet waters of his native bay, who found himself floundering in the deep sea among many great whales, would feel, in many respects, as I feel to-night. Yet I differ from the minnow in one regard. He would not be backed up by the sense that he was the mouthpiece of the other minnows. To-night I come before you charged with a most hearty welcome from the students of the O.A.C. to the members of the Experimental Union and those others, not members, who have shown their interest in the work of the Union and of the College, by attending this meeting, the 25th birthday of the Ontario Agricultural College.

During the past years, the Union has done a most valuable work, in increasing throughout the Province the interest in agricultural education. The experiments worked out through its instrumentality, and the knowledge scattered broadcast among the people through its labors, must have had a very great influence in stimulating the desire of the Ontario farming classes for more and better agricultural knowledge. Yet it is not in this that its noblest work has been done, but in keeping the ex-students united to their Alma Mater, and in promoting that broad college spirit without which no college can do its best work. I believe that in this respect its work in the future will far exceed that of the past, for now, I am happy to say, there is a better college spirit growing up among the students of the O.A.C. than ever existed before. In the future, more than ever before, we may expect to see the ex-students united by a common love for their College, and the Union will be the means whereby this love is fostered and expressed, and the work of the College expended among the people of Canada.

I would like, if I could, to draw a picture of the future, and show you what the fiftieth birthday celebration of this College will be like. So I must ask you to accompany me in your imaginations over 25 years, and imagine that you have written at the top of your last letter not 1899, but 1924. In that time it is reasonable to expect, since ours is one of the greatest domains of earth, that its face will have been much changed and improved. Our northern districts will be dotted with the chimneys of factories and farm houses. Mining towns will have sprung up as mushrooms in the night. The great prairies of the west will have yielded their wealth to the skill of the husbandman, and will be the homes of happy multitudes. In short, from the Atlantic to the Pacific, our country will have reached a stage of strong and noble maturity. It is the end of the year 1924. The green robe which covered our fair country in the Spring has grown old and shabby, has been dyed over by Jack Frost, who, not satisfied with his work, has finally stripped it off altogether and left the woods and fields bare and nude to the keen blasts of advancing winter. Our Lady of the Snows, beautiful then as now, though somewhat older, is preparing to don her famous white coat. From east to west, the husbandman has prepared for the coming of winter. The splendid herds and flocks of Ontario have been housed. The great wheat crop of the west has been harvested and threshed, and is rolling on its way to distant markets. Throughout the land the grey plowed fields give evidence of the industry of the farmer, while well-filled barns tell us that skill and labour have been rewarded bountifully. And now the whole land is waiting for the first white heralds that tell of the approach of the winter king. The colleges of our country have opened nearly two months ago, and thousands of the youth of Canada, and hundreds from other lands, have flocked to these seats of learning. Among these, the now famous O. A. C. has opened, and crowds of students passing from lecture to lecture as the old familiar bell rings out the hours, tell us that the work of another year in that flourishing institution has begun. In short, the autumn of a prosperous year has passed for Canada, and has brought round the day for the fiftieth Anniversary of the Experimental Union of the old O. A. C. Invitations have been sent to ex-students throughout our own land, and to far lands, whither our students have wandered. Old, middle-aged and young, they come, and again climb the old familiar hill, not on foot, as in days of yore when cash was short, but in the easy trolley. I am with them in spirit and look with pride upon the men who have shown themselves worthy of the old O. A. C., who have now the trust and confidence of their fellow-citizens, and have filled every position of public trust throughout the land, from Member of Parliament to Pathmaster.

There are some among them whom I recognize as belonging to the years in which I attended the O. A. C. Here I notice a small, wiry old gentleman, who evidently does not belong to Canada, but to some other portion of the Empire, possibly Bermuda. I think I recognize him, for his eye has lost none of its old-time brightness, though, alas, the luxuriant brown hair which crowned his head in happier days has disappeared, and in its stead rises a shiny white dome, fringed with a scanty line of grey. The narrow, perfect part which once separated his rich brown locks has with time widened into a regular drive-way. He is talking to another gentleman, a lean, starved man, with glasses on nose, and long arms, which show a strong desire to gesticulate frantically as he talks. He speaks with a slightly foreign accent. I think I recognize him also, but, Oh, what a change from the athlete of old days to this lean and shrivelled old man. One more I recognize. He is a fat and comfortable man, with double chin and portly form. He is reported to have succeeded rarely as a feeder of swine in the eastern part of Ontario. His old-time gallantry has not deserted him, for he is doing his best to monopolize two young ladies just across the car from him. He talks to them industriously, and as he talks he gasps for breath, for he has waxed fat and short of wind. Oh, Gurth, Gurth, can this be you? You, pugilist, poet and pig-feeder in your college days. How long is it since thou sawest thine own knee? Verily, time has dealt hardly with thee. Many more I recognize, but time will not allow me to mention them.

I might dilate at length upon that great gathering, upon the hundreds of students who are lined up to receive the visitors on the lawn, and who give the old familiar, barbaric college yell as the visitors approach. I might tell you of the hundreds of fair maidens who have come from the School of Domestic Science across the way to meet the visitors, and who are as beautiful as a bed of spring daisies, but I must leave all this to your imagination. I must also leave to your imaginations the great meeting in the Convocation Hall, and the eloquent speakers who address it, and the great dinner in the immense dining hall. You will no doubt fill in these minor details much better than I could, and gain a much better idea of the scene than I could possibly give you.

There is, however, one element of sorrow brought home to us in the contemplation of this picture. The inevitable law of nature demands that I should leave out the faces of some of those who are now with us, for as the future becomes the present and silently glides into the past, the stream of time will waft many of us into the unseen world. It would not be manly for us to avoid this element of consideration; it is Christian that we should be aware of our transiency. We can, however, hope that but very few will have passed from this land of shadows into the land of shades. I can do no better than express the wish that most of us here may live to enjoy the great meeting I have pictured in 1924.

In closing, allow me to express again the hearty feeling of the students of the O. A. C. toward the members of the Union, and the deep interest they feel in the Union's work.

RESPONSE ON BEHALF OF THE EX-OFFICERS.

Prof. J. W. Robertson, Agricultural and Dairy Commissioner for the Dominion.

I am very thankful to be here to-night, and am very sorry I was not in time to listen to all the proceedings on this most interesting occasion. Since I became an ex-officer of the College I have ceased to be a gentleman of leisure, so I had to address the Fruit Growers' Association at Whitby last evening and the Bee Keepers' Association at Toronto this afternoon, and had about four minutes and a half for supper in Guelph instead of two hours at a banquet. I am glad to be here to-night to say how proud I am to be one of the ex-officers of the O. A. C., and of the wonderful progress this institution has made during all these long years when its officers and students have tried to spread the advance of education in Ontario. Since I left Guelph I have had a chance of seeing the foremost Agricultural Colleges of England, the foremost Agricultural Colleges of France and Denmark, and I can say honestly that none of these in scope or efficiency compare with the Agricultural College in Ontario. The only superiority I found was in some places in Denmark, where the students rise promptly and punctually at four

o'clock in the morning, and pursue their studies uninterruptedly in the field, in the stables, in the dairies and in the sugar factories until 7 p.m. and take all their recreation on Sunday afternoon. The object of this College has been attained in a measure. Dnring the time I was listening to the excellent exposition by the President to-night I could realize better its main object and use in this Province, to increase intelligence not only by the diffusion of information but by the other means of increasing intelligence, which is having the students do things by themselves for themselves, skill to promote and manage the common things of common life. What is the use of knowing Greek and Latin if men and women do not know how to do the commonplace things in the common sphere of activity? Then the College has had a great deal of success in forming correct habits in those who pass through its halls; conduct and good manners; the sum of all excellent life, to so conduct one's self as to bring about the right thing in the right time and the right place. A long time ago I can remember a student coming to one of the officers in charge and asking to be excused at 3.30. On being asked why he replied "I want to make a call in the city" "Why not four o'clock?" "It wouldn't be according to society rules." I believe students have been in the habit since of calling after eight in the evening and a good deal later. On behalf of the ex-officers, who are with myself proud of our period of connection with Guelph, I will speak first of my friend Mr. Brown, the large-hearted and little-handed Professor of Agriculture. Only last year I saw Prof. Brown in London, and I hear from him occasionally now. He uniformly speaks well of Guelph and those he has known. Then I want to just say that I hear from Prof. Shaw, whose only kindness to me now is that he writes very much shorter letters than he used to write, because he had a most ferocious proclivity for writing; and he had that most delightful quality in this vale of tears in that he could be perfectly happy in doing so. I myself never could get into that state. However, Prof. Shaw is doing excellent work in the State of Minnesota, and his writings are frequently quoted in the agricultural papers of the South. Then, there is Dr. Grenside. I always thought he knew a good thing when he saw it; the best judge of a good horse I ever met; and Dr. Mills says he was an ardent Conservative. You can draw any conclusion you like from Dr. Mills' statement. He is doing admirable work in the Northern States of the United States. Then, there is Mr. E. L. Hunt, who was resident master for long years, now the Rev. E. L. Hunt. Last Christmas I got a copy of the Washington Post, one of the leading strong papers of the capital of the United States. It had a column or a column and a half reporting the sermons of the great men in Washington on Christmas Day. One third of the report was that of the Bishop in the Episcopal Cathedral, one third was that of some other eminent divine, and one-third was devoted to my friend E. L. Hunt, who spoke in the Presbyterian Church, and his sermon was the best of the three. Then, there is my excellent and honored friend, Prof. James, who has graduated into a larger sphere of usefulness, and the Province of Ontario has to thank the judgment and ceaseless activity which Prof. James showed in this College and has displayed such a large measure of in Toronto. I was in Boston a few weeks ago, in that centre of culture and wealth, and Prof. James' address on Agricultural Education was said to be the best representation given at any meeting in their whole experience. He still maintains the excellent reputation he had long years ago of being a capable and powerful speaker. Then there is Prof. Panton. He is what he was; a man whose influence will linger long with many of us, and that for good only; a scientist of rare ability; a teacher with patience to teach in christian gentleness No higher tribute can be paid to any man, even in these days, from the throne of England, great, majestic, almost omnipotent. Do you think it is the might of the great navy, the strength of that courageous arm that never flinches, or the wealth of the coffers of London, or the learning of the halls of Cambridge, or the enterprise that whitens the seas with sails or darkens the air with smoke, which has made the throne of England what it is? No, surely not. This you can say, "Victoria, Queen, thy gentleness hath made thee great" And Prof. Panton's gentleness has made him great. Then I want to say of my friend Mr. McIntosh, I can trace back some of my growth to the admirable teaching and work of Mr. McIntosh with the agricultural students at the College at Guelph. Of myself I have nothing to say, except that I am an ex-officer. I think the training I got here fitted me for doing some work in a larger degree. I hope the students will go on prospering. I hope this College will go on pros-

pering, and that its ex-officers will, so far as they can, create public sentiment in its favor. I hope the students and ex-students will join with us in our desire for its continued progress and continued usefulness, grounded securely in the confidence and affection of the students of this institution, both ex and present, so that the whole body of students will conduct themselves that the College and all its officers shall be just as securely and deeply grounded in the affections of the people of Ontario, and then the College will reach its highest possibility.

THE ONTARIO AGRICULTURAL COLLEGE AND EXPERIMENTAL FARM FOR A QUARTER OF A CENTURY.

Dr. Jas. Mills, President of the Ontario Agricultural College, Guelph.

To the Hon. Sir John Carling, of London, belongs the honor of having taken the first steps towards founding a School of Agriculture in the Province of Ontario; to him also is due the credit of having established the Dominion Experimental Farms at a later date.

Sir John Carling.
First Commissioner of Agriculture for Ontario. Original promoter of the Ontario Agricultural College.

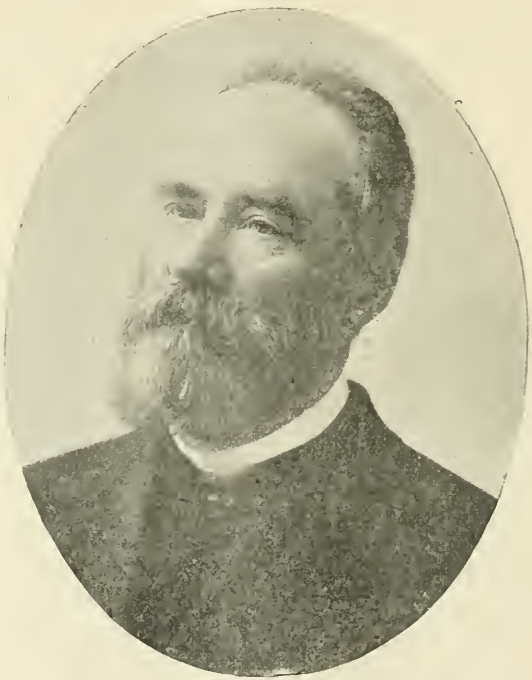
In his report for the year 1869, addressed to Governor Howland, Mr. Carling, then Commissioner of Agriculture and Arts for Ontario, spoke in complimentary terms of the system of general education in this Province, and then said: "I have a growing conviction that something more is required to give our education a more practical character, especially in reference to the agricultural and mechanical classes of the community, which comprise the great bulk of the population and constitute the principal means of our

Note.—This paper was prepared for the meeting of the Ontario Experimental Union and also for *The Farmers' Advocate*, in which it appeared December 1st, 1899.

wealth and prosperity. What now appears to be especially needed, in addition to the ordinary instruction in common schools, is the introduction of elementary instruction in what may be termed the foundation principles of agricultural and mechanical science, and I hope to be able, in the next report I may have the honor of presenting to Your Excellency, to record the fact of a commencement being made with a prospect of success."

Rev. W. F. Clarke, Commissioner.

On the 12th August, 1869, Mr. Carling appointed the Rev. W. F. Clarke, of Guelph, a Commissioner to visit the principal agricultural colleges of the United States, gain what information he could and report with the view of establishing in this Province a school to give instruction in agriculture and kindred subjects, and to conduct experiments for the purpose of solving some of the problems which confronted those who were engaged in agricultural and horticultural pursuits. Mr. Clarke's report, which appeared on the 8th



Rev. W. F. Clarke,
Commissioner who investigated other agricultural schools and colleges, and recommended plan.

June, 1870, was concise, comprehensive and scholarly, and withal practical and sensible in its suggestions and recommendations. It furnished the Minister with the desired information and indicated in outline the scope and character of a school of agriculture such as it was thought should be established in the Province of Ontario.

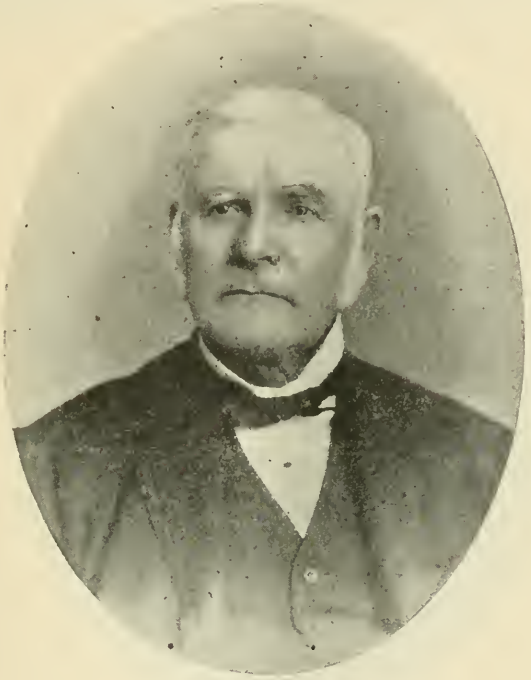
Schools of Agriculture and Practical Science.

So, in pursuance of his previous intimation, Mr. Carling, in his report for 1870, definitely proposed the establishment of two schools, one for agriculture and the other for mechanic arts, and the outcome of his recommendation and subsequent action was the founding of the School of Practical Science in Toronto, and the purchase of 600 acres of land for a School of Agriculture at Mimico, seven miles west of Toronto.

The land was purchased in 1871, and a contract for the erection of school buildings for the accommodation of 100 resident pupils, at a cost of $47,900, was entered into in November of that year; but, a change of Government having taken place that fall, the work was delayed for a time, and objections urged against the Mimico site by prominent farmers and stockmen caused some hesitation as to what should be done.

HON. ARCHIBALD MCKELLAR.

At length the Hon. Archibald McKellar, the new Commissioner of Agriculture, requested the Provincial Board of Agriculture and Arts, and afterwards Professor Miles and Dr. Kedzie, of the Michigan Agricultural College, to examine the site and report as to its suitability for an experimental farm.



HON. ARCHIBALD MCKELLAR.
Second Commissioner of Agriculture for Ontario.

Both reports were unfavorable to the site, chiefly on account of the character of the soil and the lack of church and other privileges such as are enjoyed in the immediate neighborhood of a town or city ; and the result was that a committee, consisting of John Dunlop, John Miller, John Dryden, the Hon. David Christie, and Robert N. Ball, was appointed to examine farms in the neighborhood of Whitby, Guelph, and Woodstock, with the view of getting a suitable site for the proposed school. This Committee reported the facts, without a definite recommendation, on the 13th of December, 1872, and left it for the Government to decide, which it did by purchasing the Guelph farm of 550 acres from F. W. Stone, a political opponent, in the early part of 1873.

Some additions were made as soon as possible to the farmhouse, which still constitutes the first two stories of the main building, in order to get ready for 30 pupils at as early a date as practicable.

NAME AND MOTTO.—The name decided upon was the Ontario School of Agriculture and Experimental Farm, and the motto suggested by Geo. Buckland, the genial and scholarly Professor of Agriculture in the University of Toronto, was *Practice with Science.*

LIBERAL TERMS.—In accordance with the recommendation of a Commission appointed to prepare by-laws and regulations for the school, the first years were to be regarded as a Preparatory Term, in which student help was to be largely employed to put the farm and horticultural department into shape for practical instruction at a later date. During this period students were to work seven hours a day in the outside departments, and for his labor in these departments each was to receive instruction, lodging, board and washing, with a bonus of $50 in cash at the end of the year, in

case he completed it satisfactorily and passed the prescribed examinations on the course of instruction.

Opening of the School in 1874.

On the 29th July, 1873, Henry McCandless, from Cornell University, was appointed the first Principal; and on the 26th of March, 1874, there appeared over the signature of Mr. McCandless a long advertisement announcing the opening of the school on the 1st May, 1874.

Wm. Johnston, B A.
Principal of the Ontario Agricultural College,
1876 to 1879.

List of Officers at Opening.

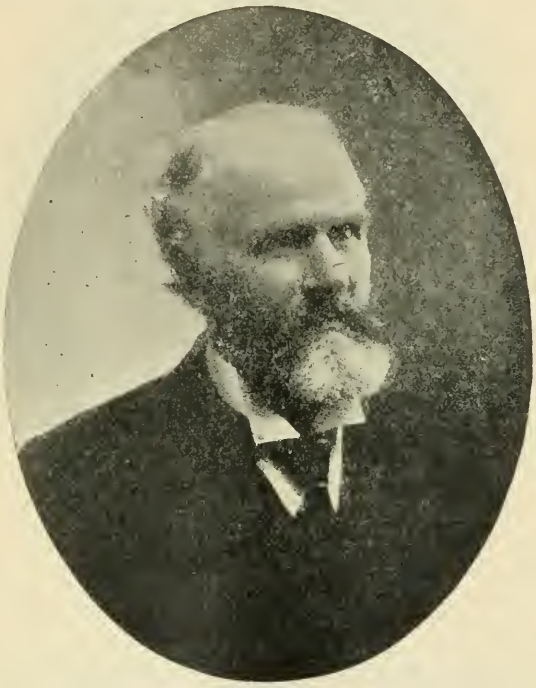
H. McCandless, from Cornell University.....Principal.
Rev. W. F. Clarke, from Guelph .....Rector.
James McNair, from Richmond Hill.....Farm Foreman.
James Stirton, from Guelph.....Stockman.
Thomas Farnham, from Toronto .....Gardener.
James McIntosh, from Guelph .....Foreman Carpenter.
Mrs. Petrie, from Guelph.....Housekeeper.
T. Walton, from Toronto .....Engineer.

Twenty-eight students entered the first term, and the outlook seemed encouraging, but the officers soon began to quarrel among themselves. In a short time the dispute between Principal McCandless and three or four members of his staff became so violent that Mr. Clark resigned on the 9th of June; and on the 13th of July, twenty-six of the students in attendance sent a petition to the Hon. Oliver Mowat, asking for the removal of the Principal. Mr. Candless resigned on the 18th of July, and the Government began to realize that its troubles had only begun.

The Second Principal.

Charles Roberts, Esq., of Haslemere, Surrey, England, a prominent graduate of Cirencester Agricultural College, was appointed io succeed Mr McCandless. He came out

for observation in the fall of 1874, but could not enter on his duties till April, 1875. In the meantime, Wm. Johnston, B.A., of Toronto, who had been appointed Rector, discharged the duties of Principal. According to agreement, Principal Roberts was on hand in April, 1875, but he was suddenly seized with an illness so severe that he decided to resign his position and return at once to his native land. Some have said that the illness was caused by the stories which were told him of the frightful difficulties, trials, and annoyances of the position which he had accepted.



James Mills, M.A., LL.D.
President of the Ontario Agricultural College,
1879 to the present time.

Third Principal.

Wm. Johnston, B.A., was employed in the capacity of Rector from August, 1874, till the end of 1875, and as Principal for nearly four years—from the beginning of 1876 till the 1st of October, 1879. Mr Johnston, though lacking in practical experience, was a man of real ability—a good organizer, an efficient executive officer and a vigorous writer. He soon grasped the situation, and to him very largely is due the credit of having placed the institution on a fairly solid foundation. He classified the work in the different departments, handled his men to advantage, an did much to give character and stability to the School.

Change of name, etc.

At the time of Mr. Johnston's resignation, and at his suggestion, the Ontario School of Agriculture and Experimental Farm became the Ontario Agricultural College and Experimental Farm, and the chief executive officer of the institution was afterwards to be known as President of the College. The writer took charge at that time (1st of October, 1879), and through storm and stress has stood by the ship for over 20 years.

Farm Superintendents.

From the outset, the office of Farm Superintendent was one of the most important in the School, and it is no less important in the College. James Laidlaw, afterwards representative of South Wellington in the Legislative Assembly, was Farm Superinten-

dent in 1875 ; William Brown, from the fall of 1875 till 1st of July, 1888, a period of nearly thirteen years ; Thomas Shaw, from the 1st of October 1888, till the summer of 1893—nearly five years; and Wm. Rennie, from 1st October, 1893, till the 1st October 1899—exactly six years. G. E. Day, B.S.A., was appointed Superintendent on the 1st October of the present year (1899).

Mr. John I. Hobson.
Chairman of Advisory Board of Ontario Agricultural College and President of the Provincial Winter Show.

Commissioners and Ministers of Agriculture.

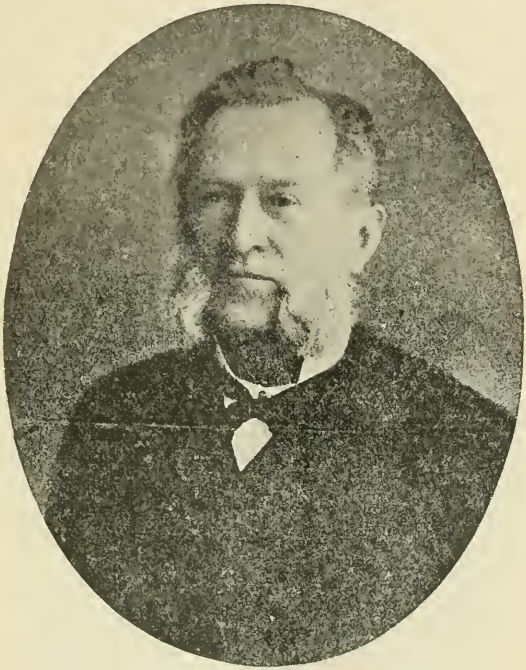
The gentlemen who, as Commissioners and Ministers of Agriculture, have had control of the School and College since the Mimico site was purchased by the Hon. John Carling are: the Hon. Archibald McKellar, about four years (1871 1875) ; Hon. S. C. Wood, nearly eight years (1875-1883) ; Hon. James Young a few months in 1883 ; Hon. A. M. Ross, about four and a half years (1883-1888) ; Hon. Chas. Drury, first Minister of Agriculture, nearly two and a half years (May 1st, 1888, to September 1st, 1890, and Hon. John Dryden, second Minister of Agriculture, over nine years from September 1st, 1890.

It would be invidious to enter into a discussion of the work done by the different Commissioners and Ministers ; but, without offence, we think it may be said that every one in the list devoted a great deal of time and anxious thought to the affairs of the College at Guelph, and did the work much better than it would have been done by any Board of Trustees or Governors.

Advisory Board

In the early days, (1874-75), there was an Honorary Council to consult with the President and the management of the school. This Council consisted of the Hon. David Christie, Hon. George Brown, Hon. Archibald McKellar, Professor George Buckland, James Young, M P., Delos. W. Beadle, Esq , and James Laidlaw, Esq. The Council disappeared when the Hon. S. C. Wood became Commissioner of Agriculture, and the Commissioner alone controlled the institution, till the year 1885, when the Hon. A. M. Ross had an Advisory Board of practical farmers appointed to assist him from time to time, especially in matters pertaining to the management of the farm. This Board is

still in existence, and consists of John I. Hobson, Guelph, chairman ; C. C. James, Deputy Minister of Agriculture, secretary ; John McMillan, M.P., Constance, Huron Co.; William Donaldson, South Zorra, Oxford Co ; Edwards Jeffs, Bondhead, Simcoe Co.; G. B. Boyce, Norham, Northumberland Co.; and D. A. Dowling, Appleton, Carleton Co.



Hon. S. C. Wood.
Third Commissioner of Agriculture for Ontario.

Strong and Weak Points.

One of the specially strong points of the Institution, from '74 to '99, has been the thoroughly and persistently practical character of its work. Many United States Agricultural Colleges are *agricultural* only in name. They have placed agriculture in the background, and have broadened their courses so as to compete with arts colleges and universities. The Ontario Agricultural College has not done so, but has always insisted on manual labor, and has given special prominence to agriculture, live stock, dairying, horticulture, veterinary practice, and other branches of study which have a direct bearing on the ordinary work of the Canadian farmer. For a long period the Farm management was severely criticised by the farmers of the Province, and was often spoken of as the weak point of the Institution ; but, in time the tide began to turn, and during later years the Farm has been made an undoubted source of strength to the College.

One undoubted source of weakness, from the beginning till 1893 (for nineteen years), was divided, and necessarily conflicting, authority. It was a cause of trouble to the first Principal ; in the form of a double headship, it led to the resignation of Mr. Johnston, the third Principal, in 1879 ; in the same form it caused endless friction from '79 to '88 ; and in other forms it endangered the Institution at a later date. It was not till the summer of 1893 that the Government had the courage to give the President full control and make him responsible for everything, thus eliminating a serious element of weakness.

Another source of weakness has been the fact that throughout its history (commencing with the change of site) the College has been systematically and persistently discussed from the standpoint of Provincial party politics. In the discussion, the institution has very often been very much misrepresented and injured ; but by keeping free from politics and attending to its work it has at length established itself fairly well in public confidence and is beginning to receive a reasonable amount of sympathy and support from both political parties.

Courses of Study, Diplomas, and Degrees.

The primary aim of the College always has been to train young men for work and life on the farms of the Province. The course for an Associate diploma, extending over a period of two years, and including both study and practical work, has been arranged with this object in view; and nothing is allowed to interfere with this aim throughout the first two years of every regular student's course at the College. Those who complete this course and obtain the Associate diploma, signed by the Minister of Agriculture and President of the College, are known as "Associates of the College."

Hon. A. M. Ross.
Fifth Commissioner of Agriculture for Ontario.

In 1887, a third year was added to the course, and the College was affiliated with the University of Toronto for advanced examinations and degrees. The addition was made at the request of Associates who wished to pursue their studies in certain departments for a longer time than was embraced in the Associate course, with a view to preparing themselves more fully for the work of the farm or for positions as agricultural writers and teachers of agriculture, horticulture, dairying, animal husbandry, chemistry, biology or entomology. The work for this additional year is heavy, and none but the best Associates are allowed to take it. The examinations on the third year work are conducted by the University of Toronto, and the B.S.A. degree (Bachelor of the Science of Agriculture) is granted to the successful candidates at the annual commencement exercises of the University.

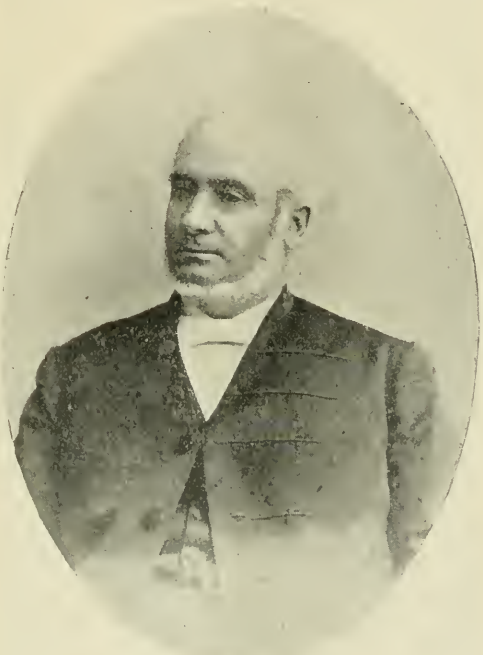
Ninety-eight degrees have been granted on the three-year course, and it has recently been decided to extend the course to four years—two years for the Associate diploma, and two additional years for the B.S.A. degree. This change is due to the fact that the additional work required for the degree has been found too heavy for one year.

A special course in dairying was announced for the first of February, 1893, and the attendance was so satisfactory that a new dairy building was at once erected, and the equipment for a permanent Dairy School promptly provided; so everything was ready for a large dairy class (over 100) in January, 1894. This school furnishes a very thorough course of theoretical and practical instruction in milk-testing, butter-making and

cheesemaking, and is divided into two departments—one for home dairy work and the other for a factory course including both butter and cheese. A special dairy certificate is given to those who complete this course.

Equipment Then and Now.

From the beginning, the institution had a very fair equipment for instruction in field agriculture and stock-raising—550 acres of land and substantial farm buildings, with good samples (male and female) of cattle, sheep and swine; three greenhouses and a large garden for instruction in horticulture, and two commodious classrooms for lectures and demonstrations on the subjects embraced in the course of study. A dairy building was erected in the early days, but little or no instruction in the subject was given for the first eleven years after the opening of the school.



Hon. Chas. Drury.
First Ontario Minister of Agriculture; now Sheriff of Simcoe County.

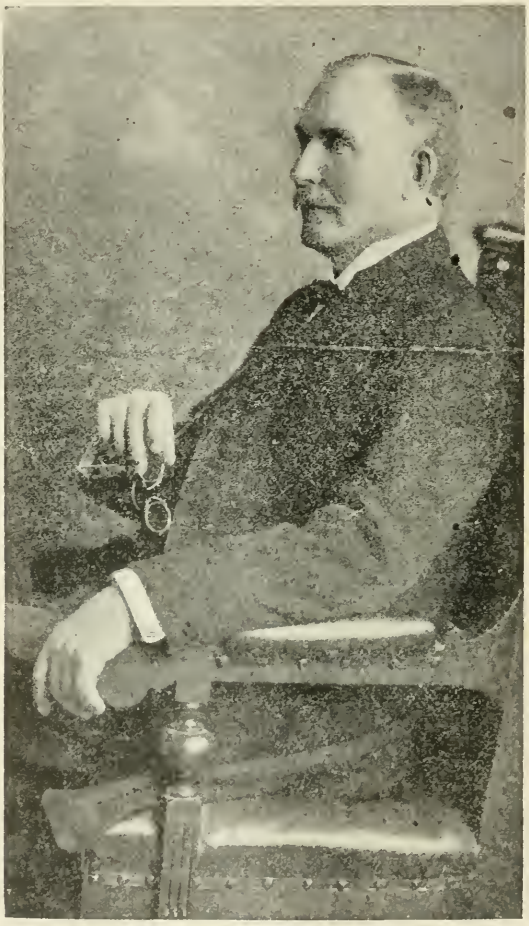
Houses for the Farm Superintendent, the Bursar, the Gardener, and the Farm Foreman were erected and large additions to the main building made in the Hon. S. C. Wood's time. New farm buildings were erected while the Hon. A. M. Ross was Commissioner, and the chemical laboratory (the first laboratory provided) was built and equipped in 1887, near the close of Mr. Ross' commissionership. The experimental barn was built while the Hon. Charles Drury was Minister of Agriculture; and the following large and important additions have been made during the *regime* of the Hon. John Dryden: New greenhouses, biological laboratory, convocation hall, dairy building (with complete equipment) and houses for the Department, poultry buildings and house for Manager, physical laboratory, experimental building, bacteriological laboratory, buildings for Experimental Feeding Department, and a new chemical laboratory (the first having been burnt.)

Present Attendance Overtaxes Capacity.

The number of students enrolled in the regular course this term is one hundred and sixty-four, thirty of whom are lodging outside for want of room in the College.

Present Position.

With an able staff of instructors and workers, and such large and valuable additions in the way of buildings, apparatus and appliances, it may be surely said that the College is now in a good position to train young men for agricultural pursuits; to do work in original research; to conduct experiments on various lines, and to lead the van of agricultural and horticultural progress throughout the Province.



Hon. John Dryden.
Minister of Agriculture for Ontario,
1890 to the present time.

The present equipment of the College may be briefly described as follows:

I.—For College Work.

A large and well furnished chemical building, containing a beautiful classroom and three commodious laboratories—one for first and second-year students in general, agricultural and animal chemistry; another for third-year students in quantitative work; and a third for special investigations and research in connection with the dairy and experimental departments.

A large and well-assorted geological cabinet, especially arranged for purposes of instruction.

A well-equipped biological laboratory, with classroom and everything required for

theoretical and practical work in botany, zoology, and general biology, including cabinets and specimens for the study of entomology, or that branch of science which treats of insects.

A large and well-equipped bacteriological laboratory for instruction and original work in the vast and highly important field of bacteriological research.

A good physical laboratory, with tables and all necessary appliances for practical instruction in dynamics, mechanics, hydrostatics, hydrodynamics, electricity, and soil physics.

General and special lecture-rooms for studying, handling, and judging live stock, especially cattle, sheep and horses, and for practical demonstrations in the veterinary art.

A complete set of greenhouses, with lecture-room and laboratory for instruction in horticulture.

Lecture-room, with all modern appliances for the illustration of lectures on dairying.

A lecture-room for instruction in English and mathematics.

II.—For Practical Work Illustrative of Lectures in the College.

A farm of 345 acres of land in fine condition, well tilled and well managed.

A complete set of farm buildings and an ample outfit of agricultural implements.

Representative specimens of the most valuable breeds of cattle, sheep and swine.

A large experimental building, and 43 acres of land, divided into about 2,000 plots for testing varieties of grains, roots, potatoes and corn, and for experimenting as to different methods of cultivation, dates of seeding, kinds of seed, value of artificial fertilizers, etc.

Special stable, piggeries, and yards for experiments in feeding cattle, pigs and sheep.

A separate dairy stable and a special herd of 30 cows for experiments in dairying.

Butter, cheese, and milk-testing rooms, with the latest and best appliances for butter-making, cheese-making, and milk-testing, and the pasteurization of milk and cream.

Two rooms devoted to experimental cheese-making for nine months of the year, and to work in the dairy school for the remaining three months.

Large and well-arranged poultry buildings, with 20 varieties of the most valuable hens, for practical instruction in the breeding, feeding, and management of poultry.

Sixty-three acres of land, including lawn, arboretum, forest-tree plantations, vegetable garden, vinery, small fruit garden, and orchards, for instruction and practical work in horticulture.

A carpenter shop, with benches and tools for plain work and general repairs.

Course of Study.

The course of study is liberal and very practical, specially adapted to the wants of young men who intend to be farmers. It embraces agriculture, arboriculture, live stock, dairying, poultry, bee-keeping, chemistry, geology, botany, zoology, entomology, bacteriology, horticulture, veterinary science, English literature and composition, arithmetic, mensuration, drawing, mechanics, electricity, bookkeeping, and political economy. French and German have recently been added for the B.S.A. degree. The purely practical or bread-and-butter subjects are well taught. The work in English is thorough, and the course in natural science is equal to that in our best arts colleges.

Outside Work.

Already the College has rendered excellent service to the Province at large by the publication of reports and bulletins from year to year, and in several outside departments of work :

(1) The Experimental Union of ex-students and others in testing manures and varieties of grain, grasses, roots, potatoes, and other crops throughout the Province—about 3,500 of them working under the direction of C. A. Zavitz, B.S.A., the College Experimentalist.

(2) The Farmers' Institutes, organized and controlled by the President of the College for ten years, and assisted by the College staff from their inception to the present time.

(3) Travelling Dairies, sent out from the College, controlled by the President, and conducted by graduates of the College.

(4) Dairy schools, east and west, under the control of the President.

(5) Fruit Experiment Stations, twelve of them and two sub-stations, testing varieties of fruit under various conditions of soil and climate throughout the Province, and preparing a description of Canadian fruits, under the control of a small Board, of which the President of the College is chairman, and the College Professor of Horticulture a member.

With due regard to modesty and professional etiquette, I think I may say that, through these organizations and in other ways, the College is imparting a great deal of useful information to the farmers of Ontario, is creating a widespread interest in agriculture, and is adding dignity to life and labor on the farm.

A Forward Movement Needed.

Progress has been the watchword of the College in the past, and it would seem that the time has come for another forward movement. Increased accommodation for students is very much needed, and there is a growing demand for instruction in domestic economy for farmers' daughters; so it would appear to be the duty of the Province to provide at once the new building which the ex-students asked for last year, and to add without further delay a large and well-equipped Department of Domestic Economy.

THE FUTURE OF THE ONTARIO AGRICULTURAL COLLEGE.

By Mr. C. C. James, Deputy Minister of Agriculture for Ontario and Ex-Chemist of the Ontario Agricultural College.

Mr. James referred particularly to two points in connection with the training of the students in the future. He thought that special instruction should be given in what might be called the study of "citizenship," so that when the students leave the College to become farmers they would at the same time be qualified at once to step into municipal life well equipped as to the duties and privileges of citizens. They should have an acquaintance with Canadian history, and be well grounded in municipal administration. They should be directed to take an intelligent interest in public questions, political, educational, and social. In the second place he thought more attention might with advantage be given to the special training of the students for Farmers' Institute work. Every student on leaving the College should have in his head and in his pocket at least two practical addresses or papers that he could give at Farmers' Institute meetings and defend against critics. These papers should be prepared under the direction of the staff and have been discussed before the students and staff. Many hints could be given to the students that would be exceedingly valuable in preparing for such work.

Beyond these two pieces of advice or suggestion he did not venture to prophesy. As the future, however, is largely the outcome of the past, he could only look for a most prosperous development of the institution, since after a varied experience the College has become so firmly established in the estimation of the class for which it was instituted.

ADDRESSES.

Hon. Chas. Drury, Ex-Minister of Agriculture for Ontario.

This is my third visit to the Agricultural College since the termination of my connection with it in 1890. It has not been that I have not been interested in the work done here. I may say that I have read carefully the various valuable reports and bulletins which have been issued by the College, and have been deeply interested in everything done during these years, and my failure to put in an appearance has not been because I have lost interest in the work but from causes beyone my control. I can truly say that it is a pleasure far me to be here to-night, and my deep earnestness with regard to this question is evinced by a fact which you will understand in a minute or two. I am glad, Sir, to meet you, the President of this Institution. I do not desire to say

flattering words, but desire to be just, and a word of praise from me may not be out of place. When I first become officially connected with the College my knowledge of the President was very limited. I may say that my interest in him grew with every day and every week and every month of my knowledge of his doings here. I found the Principal to be a safe man ; I found him to be a true economist. I do not pretend to say that I can look back with unmingled pleasure to my short official connection with this College. I, myself, passed through stormy scenes during the two or three years I was connected with the College. I had the misfortune to be connected with it during a time of great turmoil and anxiety. I congratulate you, Sir, that you have outlived all those things—that these dark and unpleasant things have passed away forever. My congratulation is that your rooms are more than filled, that you have the largest number of students enrolled that have ever been enrolled in the history of the College, and I believe it is true that never in the history of the College has there been such strong public sentiment backing up the work done at the College. I see carried out on these grounds improvements which I had in my mind but which, from causes to which I ueed not now refer, I was not permitted to be the instrument in carrying out. I am glad that my worthy successor has been liberal in his expenditure and has been progressive in his ideas, and when I stand as I do and look at the vast improvements which have taken place, I feel that great praise should be given for his progressive ideas and the work done under him. What shall I say of the College? I have but one only son. I am glad to say that since he was a small boy I have drilled into him that farming was the best occupation under the heavens, and I am glad to say that he is in ardent love with the farm. Then, Sir, the fact that he is here is the highest compliment I can pay you of the useful work which is being done here. I know personally that the students of this College, the Associates and those who have taken the University degree, are exerting beneficial influence over the agricultural interests of the country ; that the ex-students of this College are represented by three of the noble contingent of the first thousand who went from Canada to South Africa. So that, Sir, you may take to yourself praise, some of it at all events, that while you strove to teach the boys the secret of successful farming, you did not neglect to implant in their minds love of country and that noble Empire of which we form a part, otherwise we would not have found that three of the College would have had a desire to serve that Empire by enlisting as soldiers. You have not only implanted in their minds the desire to excel in agriculture, but we will give you the praise of having filled them with love of country. I trust the country will be willing to increase the expenditure for agricultural education. I trust the time is not far distant when this question of assisting the College liberally, or its management, will cease to be a matter of political discussion, when all parties will rally in support of it, believing that we have the best interests of the country at heart. I wish you, Sir, long life in your present position, and trust you may enjoy growing prosperity in the noble work to which you have devoted your life.

JOHN I. HOBSON, CHAIRMAN OF THE ADVISORY BOARD OF THE ONTARIO AGRICULTURAL COLLEGE.

I think my first duty is to thank the officers of this institution, or those who have had to do in the getting up of this re-union, for their courtesy and kindness in giving me an opportunity to be present with you to-night. I would congratulate you, Mr. Chairman, and those associated with you in the work of this college, in the splendid gathering you have, indicating as it does the large and wide interest which is being taken in this educational work. When my friend here, Mr. Monteith, opened out with the remark that he had forgotten or mislaid his notes, it brought to my mind an occasion when Sir Richard Webster, the famous English lawyer, was invited to a luncheon in Toronto. He was invited by telegram on the train between Kingston and Toronto. He commenced his remarks by saying he was very sorry he had not had a longer time—if he had only had a few hours to spare, he could have prepared one of those nice little impromptu speeches which take so well on an occasion of that sort. I thought Mr. Monteith's was a case in point, and I am not sure if it might not sometimes be a good thing if speakers did occasionally lose their notes. I will just refer to what one or two of the other speakers dealt with. Prof. Robertson referred to the valuable work done in this Institution, and he compared

the work done here with that done in other colleges in other countries. I may say that I can fully bear out, as far as my knowledge goes, and it is somewhat extended, every word which the Professor has said, and I believe it is not saying too much to say that this college has a world wide celebrity for the excellence of its teaching of the science and practice of agriculture. I think it can be borne out by men who know more vastly than I do that there is not in the world to-day a college during purely agricultural work which is the equal of the Ontario Agricultural College. You may say it is all talk, but I may tell you here that some two years ago, when I was in Edinboro, there was a meeting of the Agricultural Section of the Scotch Chamber of Commerce. I was invited to join them, and it happened then that the subject which was up for discussion was the desirability and wisdom of asking the Imperial Government to set apart a large sum of money for the purpose of building, equipping and carrying out of an institution similar to this. But what pleased me as a Canadian was this, that some of the most noted agriculturists of Great Britain, such men as James Biggar of Dalbeattie, and others, rose up man after man and spoke of the work done here. These gentlemen had visited this college and knew what they were talking about. Prof. James spoke of the very small number of boys attending college compared with the 300,000 sons of farmers in the Province. I do not know that that is exactly the right way to measure the influence which is permeating through the whole country as the good result of the education acquired here. I know this, as a judge of prize farms for a good many years I soon realized that there is no more powerful factor for good or ill than simply the force of example. You drive through a village in this country; you see the nicely built church, the neat little school house and well kept sidewalks. I soon learned that that was an index to the farmers around there. These young men go out from this college and are met with in the far off territories of the Northwest; you will meet them down in the Maritime Provinces; you will meet them all over this Province. We do not mean to say that every boy who goes to this college is a great success, they are not in any calling in life, but the large body of young men who go out from this institution are systematically trained, they have a larger knowledge than those who have not had such an opportunity, and have a great influence on those living around them. The influence from this college is probably much greater than we are aware of. Prof. James also spoke of the education which it was desirable our young men should have, an education which tends to good citizenship. I think we cannot place too much stress on that. I think it is a reproach on the farmers of this country that it is said of them, considering their relative number compared with those of other callings and considering the relative importance of agriculture, that there are too few of them who fill those positions of honor in the land, that they have too little to do with the councils of our country. We may depend upon it that it is a matter of the highest importance that the education of our young men should be more fully carried out. One word to this large number of bright looking young men sitting here to-night. Young men, do not make the grievious mistake of thinking your education is finished when you leave here. The real education of life is that which is acquired after you leave the school-room. A few weeks ago when I was in Toronto I attended one of the leading churches in the city, and the minister made this remark during the course of his sermon. He said that the future of a boy might be figured upon if you only knew how he spent the few hours after he quit work in the evening until bedtime.

Mr. James McIntosh, who had been at the College since it was first started, received a warm reception from the "Old Boys" as he took the platform. Mr. McIntosh made a very pleasing address, relating many college reminiscences which were greatly appreciated by both ex-students and the present students.

G. C. Creelman, B.S.A., Superintendant of Farmers' Institutes for Ontario.

Mr. James suggested in his address the preparation of students here for after life, and particularly preparation for work in Farmers' Institute meetings. Last week, in one of our most important districts, namely, East Northumberland, we had one of our afternoon meetings presided over by one of the graduates of this Institution, Mr. Bates, of Brighton; and the one who acted as secretary was another, and the programme consisted of an address by Mr. Rennie and an address by Miss Maddock, a graduate of the Dairy School. In most of our Institutes we have on the staff as Directors

or Secretaries, or on the platforms, representatives of the body of graduates connected with this College. So that some work is being done in that direction. Unfortunately Mr. Rennie had a fainting spell, and I received a telegram from the meeting stating that another delegate had to be sent. I immediately telephoned to another ex-student to step in and fill the breach. And I had a telegram this morning to say that they had a rousing good meeting. So you see that the ex-students are already taking their places on the platforms of the country and doing their work. I would nevertheless be pleased to have the suggestion of Mr. James carried out. I was going to say a word or two in reference to the past and present condition of the Ontario farmer. Fifteen or twenty years ago the graduates and students in those days had their attention called to the grain growing of the country. After we came down from those hard times the farmers began to think more seriously about the future of their boys, and so long as wheat was a dollar or more the boy knew he was going to get a new pair of long top boots for fall, and a good imitation of fur cap, and he was happy ; but when it came down to fifty cents a bushel he had to get out the old top boots, and have the heels straightened by the shoemaker, and wear the old cap. When grain got so cheap on the market the farmers turned their attention to feeding it on the farm. First, the cheese factories and creameries throughout the country became much more common, the people on the farm sent their products to the factory, and the result was that they had cash coming in every month of the year instead of in the fall only. Second, the poultryman began to give more attention to killing and dressing for the market, and to-day the quality of fowl on the market is not that of a few years ago at all. Where a few years ago the apples were only the best of the pickings, now those very apples, with the appliances we have for spraying and killing the worms, have been so improved that the average Canadian farmer's orchard will bring in anywhere from $50 to $500 a year for apples alone.

H. L Beckett, B.S.A., President Experimental Union, Hamilton, Ont.

I feel very much pleased indeed to be here to-night to speak to you as an ex-student of the College. The Experimental Union is something we look forward to during the year. Not the least attraction, perhaps, we find here, is the annual supper. You know the old saying that the way to a man's heart is through his stomach, and I think Mrs. Craig has found that out. To the present students I would say make the most of the opportunities you have here. I am afraid in a great many cases the students fail to realize the opportunities they have at the present time. We have heard grand words of praise from the officers of the Institution, and I think that in a great many cases the students could make better use of their opportunities here. It is only after we leave these halls that we realize a great deal of time was wasted, and I would like to impress upon the students who are here now to try and make the best of their opportunities while they are here. In speaking of the students as a body I may say that when I entered the College in 1890, I was agreeably surprised at the high character of the students of that year. I was through the College to the end of the first term, and I never heard a student use an oath in all that time. That, I think, is something that cannot be said of many colleges. In the three years I spent at this Agricultural College I never saw a quarrel, I never saw a fight, and that I think shows that the moral influence of the College has been very great for good. I think the students that go out from the College are greatly improved in their morals, and I think that in a great many ways besides educational advantages they are benefitted. One of the best advertisements the College has at the present time is the ex-students, and as long as they represent the College to advantage, as long as they have a warm place in their hearts for the College and try to spread its praise, then I think so long will the College flourish. I am pleased to say that many of the ex-students whom I know have very warm recollections of the College, and they look forward from year to year to the Annual Meeting, and it has got to be something very serious indeed which will keep a great many of them from coming here.

Prof. G. E. Day, Ontario Agricultural College, Guelph.

It seems to me that very little has been said with regard to our Experimental Union, and I would like to say just a word or two in that connection. We all know that large

sums of money have been granted in past years to the interests of agriculture, and we hope that in the future the grants may be increased. As to the method of applying those grants, of course, there may be room for discussion and difference of opinion, but it seems to me that all of us will agree that whatever money has been expended on our Experimental Union has been well spent. I can speak freely concerning the Union because, though I am proud to be called a member, yet, owing to my position, I am not really able to be an active worker, and so what I may have to say does not apply to my own effort along that line. There is a danger in connection with public grants, and we find in many cases there seems to be a tendency, when a difficulty arises, instead of the people themselves making an effort to overcome it, to appeal to the Government, while those who are most interested sit idly by and do nothing to help along the projected work. Now, that does not apply to our Experimental Union; and, by the way, it seems to me we will have to change the name of our Union, because the name we have may be misleading. It certainly is not an "experimental" Union any longer; it is established beyond the shadow of a doubt. One of the main reasons why our Union has attained to the degree of success which it has is owing to the fact that it is founded upon sound principles; it is founded upon the principle of co-operation. There is co-operation between the members of the Union, and there is co-operation between the Union as a whole and the Government, and as a result we have a strong combination for effective work. I am sure you will all join with me in wishing our Experimental Union the highest possible degree of success.

As I am the last member of the College staff to speak, I should, perhaps, be lacking in duty if I failed to express our gratitude to the gentlemen who have spoken so kindly of the work we are attempting to do in the College; we appreciate very highly the kind treatment we have always been accorded by the members of the Experimental Union.

A WORTHY INSTITUTION.

The following editorial appears in *The Farmers' Advocate* of December 1st, 1899, accompanying the article by Dr. Mills that appears in this Report on pages 63-74 :

It affords *The Farmers' Advocate* genuine satisfaction to give in this issue a résumé of the past and present of the Ontario Agricultural College at the Royal City of Guelph; satisfaction, because it is an institution upon which the farmers, not only of this Province but of all Canada, can look as a credit to the great industry which it exists to serve. Its progress through the quarter-century past, and its condition to-day, must be a source o fgratification to all who have had to do with its inception and its development. Education, investigation, and demonstration are its three-fold purpose. In common with many other like enterprises, it has had to face positive opposition and some criticism that was probably not always unwarranted; men have been skeptical of its utility, and others have regarded it with a species of negative indifference not infrequently the fate of state-aided concerns. These obstacles have in a large measure been overcome, and it is to-day the center of an ever-widening influence for good. The progress of the institution has not been of the pyrotechnic sort, but, corresponding with nearly all advancement that is of any real or permanent value, has been patiently, though steadily, made like the growth of an oak. Consequently, the secure and honorable position which it now holds is all the greater credit to its promoters and staff. Does the reader ask for proof of the foregoing statements? We point to the college now thronged to overflowing with students, the brightest of young men from Canadian farms; to the results of experimental work that commend themselves to the practical men and other investigators of standing throughout the continent; to graduates chosen for important positions in similar institutions; and to a farm proper that is clean, creditable, and growing luxuriant crops, the result of a system of tillage that seems well adapted to the soil there, and by the application of manures produced on the farm.

But what of its future? Has the institution attained perfection? Has it reached the limit of its usefulness? We trow not. Agriculture is of sheer necessity progressive, because the conditions that confront the farmer are subject to change; hence, its scope

and equipment must be enlarged and enhanced. We have, therefore, no hesitation in saying to the newly-reorganized Government of Ontario and to the legislators of the Province generally that any cheese-paring policy toward the O. A. C. will not commend itself to those who have the well-being of agriculture at heart—in other words, to the men who lead the van. Indeed, we look forward to the time when Canada will sustain not one only, but half a dozen agricultural colleges or schools.

We would encourage farmers instead of sending their sons to the Collegiate Institute and High School, say, after passing the entrance examination, to give them a good course of two years at least at the Agricultural College. Why? In the first place, the cost would be less—though that is a comparatively trifling matter—for all students have an opportunity by working on the farm to earn a portion at least of their board, and that occupation is most healthful and strengthening. Natural science occupying so large a proportion of the O. A. C. course, supplements the lack of it which is the weakness of the Ontario public-school curriculum. This will accord with the more modern view of the superiority of science-teaching as against the old classical system of education. With the former the student learns to know and *to do* by *doing*, training his faculties by a study of the things and the processes with which in actual life-work he has to deal. By increasing a love for nature it will check the tendency to leave the farm, to which, as the records actually show, the great bulk of the Agricultural College students return. The associations at the O. A. C. are such as to create greater respect for agriculture, and, other things being equal, should make those who take a course there more successful farmers. But the supreme function of education is not merely to impart information nor to train the student how to do things so as to succeed in acquiring wealth on the farm, but, above all, to develop manhood.

> "Ill fares the land to hastening ills a prey
> "Where wealth accumulates and men decay."

Herein lies the paramount importance of maintaining and liberally sustaining a college staff of high character and qualification, infused with the true genius and spirit of education. Coming under such influences for a fairly complete term, the young man will receive an inspiration which he does not get at the ordinary school, and the great body of students acquire, as we believe they do at Guelph, a morale or an *esprit de corps* which, coupled with the other advantages of the institution, must prove to them of incalculable benefit in the battle of life.

THIRTY-FIRST ANNUAL REPORT

OF THE

FRUIT-GROWERS' ASSOCIATION

OF

ONTARIO.

1899

(*PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO*).

PRINTED BY ORDER OF THE

LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO;
WARWICK BRO'S & RUTTER, PRINTERS.
1900.

THIRTY-FIRST ANNUAL REPORT

OF THE

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

1899.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—I have the honor to submit for your approval the Thirty-First Annual Report of the Fruit Growers' Association of Ontario. The discussions therein contained are upon matters of great importance to the Fruit Growers of our Province, such as the best export markets and the best and most economical methods of transportation.

I am, Sir,

Your obedient servant,

L. WOOLVERTON,

Secretary.

GRIMSBY, January, 1900.

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

OFFICERS FOR 1900.

President.....W. M. ORR, Fruitland. Ont.
Vice-President.....G. C. CASTON, Craighurst, Ont.
Secretary-Treasurer and Editor of the Canadian Horticulturist..LINUS WOOLVERTON, M.A., Grimsby, Ont.

Directors.

District No. 1.....W. A. WHITNEY, Iroquois.
" 2.....R. B. WHYTE, Ottawa.
" 3.....HAROLD JONES, Maitland.
" 4.....W. BOULTER, Picton.
" 5.....THOMAS BEALL, Lindsay.
" 6.....ELMER LICK, Whitby.
" 7.....MURRAY Pettit, Winona.
" 8.....A. M. SMITH, St. Catharines.
" 9.....J. S. SCARFF, Woodstock.
" 10.....J. I. GRAHAM, Vandeleur.
" 11.....T. H. RACE, Mitchell.
" 12.....ALEXANDER McNEILL, Walkerville.
" 13.....C. L. STEPHENS, Orillia.

Auditors.

A. H. PETTIT.....Grimsby. GEORGE E. FISHER.....Freeman.

COMMITTEES.

Executive:

PRESIDENT. VICE-PRESIDENT. SECRETARY.

Finance:

W. M. ORR. M. PETTIT. A. M. SMITH.

Board of Control Fruit Experiment Stations:

W. M. ORR. W. BOULTER. A. M. SMITH.
LINUS WOOLVERTON (*ex officio*).

Fruit Exhibit:

PROF. MACOUN. W. H. DEMPSEY. E. MORRIS.
C. W. VANDUZER.

Resolutions:

THOS. BEALL. A. H. PETTIT. W. A. WHITNEY.

Grading and Inspection of Fruit:

A. H. PETTIT. E. D. SMITH. GEO. E. FISHER.
G. C. CASTON. MURRAY PETTIT. T. H. P. CARPENTER.

San Jose Scale:

M. PETTIT. W. M. ORR. ROBT. THOMPSON.
GEORGE E. FISHER. JOSEPH TWEEDLE. E. D. SMITH,
E. MORRIS. W. H. BUNTING.

Codling Moth:

JOSEPH TWEEDLE. E. D. SMITH. W. M. ORR.
A. H. PETTIT.

Transportation:

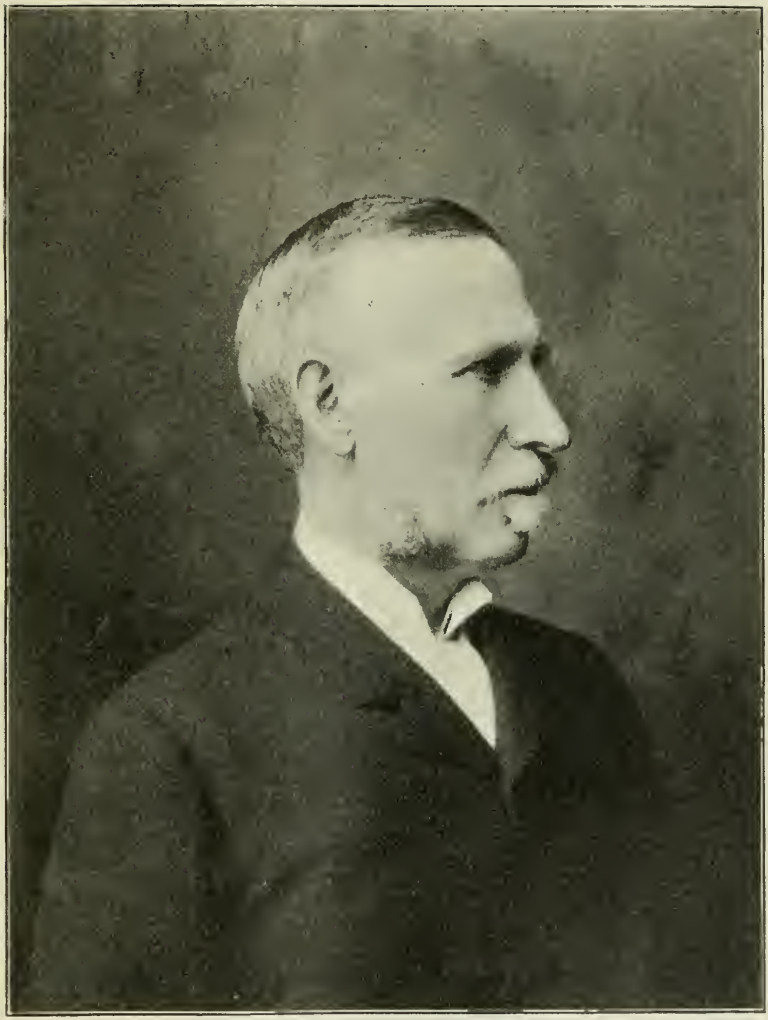
W. H. BUNTING. A. H. PETTIT. E. D. SMITH.
T. H. P. CARPENTER.

Good Roads:

ELMER LICK. G. C. CASTON. H. JONES.

New Fruits:

PROF. H. L. HUTT, O.A.C. Guelph. PROF. W. T. MACOUN, Central Experimental Farm, Ottawa.
LINUS WOOLVERTON, Grimsby.



MR. W. M. ORR, FRUITLAND.

President of Fruit Growers' Association, 1900.

Packing Apples for Export, in the Orchard of Mr. Pay, St. Catharines, Ont.

CONTENTS.

	Page
Officers and Committees for 1900	4
Annual Meeting	11
Hardy Fruits along the St. Lawrence : W. A. Whitney	12
Pears for the Professional and Amateur Grower : E. C. Beaman	17
Top Grafting and Irrigation : J. I. Graham	20
Trickery in the Packing of Apples for Export : A. H. Pettit	24
The Production of High Grade Fruit. G. T. Powell	32
The Profits of on Apple Orchard properly Sprayed : E. B. Edwards	48
Committee on New and Seedling Fruits : Prof. H. L. Hutt	49
Report of Executive Committee	54
Conservatories in our Homes at small cost : Dr. Harrison	57
Beautifying Country Houses : Prof. H. L. Hutt	59
A Knowledge of Fruit Growing : J. E. Farwell	64
The San Josè Scale : G. T. Powell	67
Treasurer's Report	69
Report of Fruit Exhibit Committee	70
Report of Committee on Transportation of Fruit	71
Commerce in Large Fruits : Prof. J. W. Robertson	76
Report on San Josè Scale : Murray Pettit	92
Experimental Spraying in 1899 : W. M. Orr	95
Experiments in Spraying at the Central Experimental Farm : Prof. W. T. Macoun	100
Hardy Fruits for the North-West : Dr. Wm. Saunders	109
The North-West as a Market for Ontario Fruits	113
Trickery in the Packing of Apples for Export	113
Report of Committee on Fruit Pulp : W. Boulter	116
Mushrooms : Rev. Dr. Hare	117
Canadian Fruits at the Paris Exposition	119
The Manchester Ship Canal : R. D. Harling	121
List of affiliated Horticultural Societies	123
Index	124

FRUIT GROWERS' ASSOCIATION OF ONTARIO.

ANNUAL MEETING.

The thirty-first annual convention of this Association opened at Whitby on December 5th, 1899.

W. M. Orr, Vice-President, said: Gentlemen,— In the absence of our efficient President, Mr. Wellington, who is in Europe, it becomes my duty to take the chair and call this meeting to order. I am glad to see so many directors present with us, but very sorry indeed that we miss some old familiar faces, unfortunately through sickness. You will see by the programme there is very important business to come before us. The question of the San Jose scale, the fraudulent packing of apples, and many other topics of interest are on the programme. I am sure they will have your very best consideration. I will ask the Secretary to read some correspondence.

Secretary Woolverton: In addition to the letters that were read last night at the meeting of the Board of Directors explaining the absence of some of our directors—Mr. T. H. Race, of Mitchell, A. M. Smith, of St. Catharines, and two or three others who could not come on account of illness, I have also a letter from the Minister of Agriculture for the Dominion in response to a resolution that was passed by this Association a year ago asking that Mr. Orr be added to the staff of representatives at the Paris Exposition to assist in seeing after the interests of Canadian fruit growers. I have also a letter from Auguste Dupuis regarding fruit for the Paris Exposition. I have a letter from W. W. Dunlop, Secretary of the Montreal Horticultural Society, and one from A. McD. Allan, regretting his inability to attend this meeting of our Association.

Mr. Powell, Ghent, was introduced and said: It certainly gives me pleasure to meet with you at this time and to bring greeting to you from the fruit growers of New York State. I feel that certainly we have a very common interest when we come to consider the extent and the magnitude of the work of horticulture, and I am always delighted to meet with those who are making horticulture their study and their life work. It represents to us I think the very best line of work. It represents to us I think the very highest of promise for the reason that it is attended by so many difficulties; and I find that any business that is attended by great difficulties calls out the very best that there is in men. You are not the men who give up to difficulties, but you meet them and are determined to solve them; and that is why I say that the future promises to fruit growers and to horticulturists so much, because of the determination to surmount difficulties. For that reason the future promises great in fruit culture, for the demand is for the finer and finer product continually. We all know from our own personal experience that when we go into the markets of the world to-day, or even into our home markets, there is a steady growing demand for a finer product; and that calls for special effort and for particular study on our part to overcome the difficulties of learning fruit culture in the control of injurious insects, in the control of all the fungus life that is making such inroads upon the value of our fruits; it calls for constant study and application of scientific knowledge and principle in our work in order to bring it to the highest standard of quality that is this day required. So it gives me very special pleasure to meet with this body to-day represented in your Association, because I know that you are men who are at the front in the study, and also are aiming at good practice in your work. It will certainly give me very much pleasure to meet with you through all the sessions of your meetings as far as time will possibly admit. (Applause.)

COMMITTEES.

The following Committees were then appointed :

NOMINATIONS : G. C. Caston and J. S. Scarff (by the President), and R. B. Whyte, W. H. Dempsey and R. L. Huggard (by the meeting.)

FRUIT EXHIBIT : W. H. Dempsey, E. Morris and C. W. Van Duzer.

RESOLUTIONS : Thos. Beall, A. H. Pettit and W. A. Whitney.

HARDY FRUITS ALONG THE ST. LAWRENCE.

BY W. A. WHITNEY, IROQUOIS.

It is well known that the vicinity of bodies of water is favorable to fruit production. For instance, the Niagara peninsula, situated as it is with Lakes Erie and Ontario and the Niagara River on three sides of it, is highly favorable to fruit raising, while places farther west in the same latitude are less favorable. The valley of the St. Lawrence, though lying farther north on both sides of the 45th parallel of latitude, is considerably tempered by the river, which has an average width of 1½ miles and is open all winter for a great proportion of its length, owing to the swift current and rapids. An important point is that the water comes to us from the great lakes in a warmer region. The thermometer indicates a lower temperature a few miles inland than along the river banks. While orchards are very few in number and sickly in appearance in the northern concessions, almost every farmer near the St. Lawrence can and does raise a good orchard.

A good proportion of the soil is a gravelly loam, which proves favorable to fruit trees even without underdraining. And even on heavy clay soil I have seen trees still bearing which must have been 70 or 80 years old. It is claimed, and I believe justly so, that such fruits as we can raise along the St. Lawrence are superior in quality and in keeping properties to the same kinds raised in the West. The Snow apples grown on Montreal Island are the finest in the world.

Experience has taught our fruit growers to be content with but a few varieties. In the past, smooth-tongued tree agents, with their wonderful cuts of large fruits, succeeded in imposing upon the unwary. A rapid growth and an early death was the inevitable result. We are now content with the survival of the fittest in fruit. I think it advisable for the present to recommend only varieties of known hardiness and productiveness. Several of the newer varieties are giving great promise, but I dare not make any definite statements just yet as to their subsequent worth.

I would suggest the following varieties in the order named for productiveness and commercial value, viz.:—

Summer : Yellow Transparent, Duchess and Red Astracan.

Early Winter : Fameuse, Scarlet Pippin, McIntosh and Wealthy.

Late Winter : Scott's Winter, Salome, Seek-No-Further, American Russet, Yellow Belleflower, Ontario, Talman Sweet, Canada Red.

Perhaps I might include the Pewaukee and the Ben Davis, but I would prefer to wait till further testing.

The main dependence is on the Fameuse, or Snow. Its good qualities are its hardiness, its fine flavor, either for cooking or dessert, and commercial value. It does not fall easily by high winds. It is in good demand. But it dislikes a low, stiff soil. This objection is obviated by underdraining. Fully 80 per cent. of our apples are Fameuse.

The McIntosh originated in my own township—Matilda, in Dundas county. It is, with us, one of the hardiest kinds. Its large, luscious fruit leaves little to be

desired. It keeps far into the winter. But it drops badly before picking time, and no apple suffers worse from the black spot. Spraying, which is now fast growing to be a necessity in the St. Lawrence valley, will make the McIntosh an almost ideal apple.

The Duchess, as elsewhere, is perfectly hardy along the St. Lawrence. It is not largely cultivated, however, for it ripens too early and keeps so poorly that the market is soon glutted. It is too sour.

The Ontario has been fruited with us, and the tree gives promise of being hardy. It is hoped that another good winter sort may be added to our list, but it would be rash to plant largely till a further test is made.

The Pewaukee has won great favor so far at Lancaster.

The Scarlet Pippin is another promising apple. Fruit has been sold in Montreal this fall at $5 a barrel, and more wanted.

The Wealthy is very hardy, does not spot, and bears heavily, but, unless it is severely thinned, it drops its fruit, and the apples are small. Its flavor is not agreeable to all.

The Talman Sweet may be considered fairly hardy.

Other kinds are being tested, and some of them may prove worthy of finding a place in the half-hardy list. and perhaps in the hardy list. A few of the tender kinds are doing very well where they are top-grafted on selected native stocks.

Pears are not successful. The Flemish Beauty and Keiffer are tried more than any other varieties, and in sheltered spots will live to be well grown and will bear fine fruit.

It is not safe to plant the pear for commercial purposes. There may be possibilities in future from Russian varieties and other hybrids. Cherries do better than pears, but there are few planted.

Grapes of all kinds do well, but there must be careful protection in winter. The low price at which western grapes are sold forbids our raising them for market, owing to the expense of covering the vines well with earth in the fall. Last winter I failed to cover a part of my vines. The result was no fruit this year, but vigorous new shoots grew and I may have a crop next fall. Only the earliest maturing kinds are desirable, such as Concord, Worden, Delaware, Moore's Early, for fear of early frosts.

In strawberries our most satisfactory kinds are Crescent, Wilson, Manchester, New Dominion and Bubach. We have tried many kinds, but all have some lack, and some lack all good qualities. Although the same holds good of all fruit it is more especially applicable to strawberries, and that is that a variety that does well on one kind of soil may not do so well on a different kind of soil in the same vicinity.

Plums are a very uncertain crop. The trouble is not so much in the hardiness of the trees as in the thawing and freezing in March and April, which injures the blossom buds, and perhaps in the cold, east winds in spring. Our best kinds are Lombard, Saunders, Glass Seedling and Yellow Egg. The Ritson cannot stand our winters. Japanese plums are still in the experimental stage.

In Black Caps, Older and Conrath have both proved hardy without protection. Gregg is tender and Columbia does not seem quite up to the mark either in vigor or hardiness.

In raspberries the Cuthbert is mainly planted, but it suffers from frost at the tips.

In treating on fruits hardy along the St. Lawrence. I have tried to rely mainly on my own experience. It may differ from the experience of others in other parts of the St. Lawrence valley. It is not well to be arbitrary in our opinions, but to be open to conviction.

I would close by saying that I have just seen again the report of the Ontario Fruit Experiment Stations, and that I think it is very reliable.

Mr. E. MORRIS: Do you find the Scarlet Pippin as hardy and productive as the Fameuse and McIntosh Red?

Mr. WHITNEY: It is not as well tried as the others, but so far as we have tried it we find the tree very reliable. Mr. Harold Jones, who is present, is a better authority on that than I am.

The SECRETARY: Yes, he is the originator.

Mr. HAROLD JONES: I have four or five specimens of the apple at the hotel which I did not bring to the meeting. With regard to the character of the trees and fruit I might say that the tree is upright, perfectly hardy in root, branch and fruit. I have never suffered from winter injury at any time, and never failed to get a good crop. The tree is inclined to bear every other year, but with careful trimming we can get an annual crop. The season of the fruit is the same as the Snow. It is at its best during the latter end of November, and it is also good all through the month of December. The color I think is a brighter scarlet than either the Fameuse or the McIntosh Red, and it seems to take the eye quicker than either of those apples—I don't know why. Place the Fameuse and the McIntosh Red and the Scarlet Pippin all on the same market, and the Scarlet Pippin goes first and goes at good prices, and it seems to give excellent satisfaction where it has been taken in by private families. It is not free from fungus diseases, but it is not as subject to the scab as the Fameuse or the Snow. It is a chance seedling.

Mr. G. Y. SMITH (Whitby): Is it sour?

Mr. JONES: It is mild sub-acid.

Prof. MACOUN (Ottawa): I brought some specimens of the Shiawassie Beauty with me. It is a great favorite with me. I have had it fruit at the farm three or four years. It is one of the most promising apples for family use. It is very much like the Fameuse, but larger, and the color is better with us at Ottawa, and the tree seems hardier, and altogether I think it is one of the most promising apples we have. It is a very heavy bearer, but bears every other year. We have them up to the middle of January.

The SECRETARY: Have you any difficulty about it dropping? I have found it inclined to drop.

Prof. MACOUN: Our experience was that it hung on the tree better than any other variety in the orchard. There was scarcely a windfall all summer.

Mr. MORRIS: Have you the Scarlet Pippin?

Prof. MACOUN: We have some young trees that have been in three years, and they are among the healthiest we have in the orchard.

Mr. JONES: I might say that the Ontario apple is decidedly in the experimental stage with us. I see Mr. Whitney says there is one orchard man who has taken to planting 200 trees in the spring. I am afraid I am the victim. I will plant 200 trees, but I am planting largely every year any way, and if I should experiment with 200 trees in a commercial orchard it might not be so great a loss to me as it would be to other people who just want to plant one orchard with good stock. Although I intend to plant 200 in the spring, I must say the Ontario apple is in an experimental stage as yet; its hardiness is not proved.

Mr. E. MORRIS: I want to warn fruit growers about one failing of the Ontario—that it dies in the top. If it were not for that it would be one of the best apples we have. I have heard it spoken of as one of the best exporters there is; in fact, when taken to England people will buy it for Northern Spy if not told the difference.

Mr. MACOUN: I would like to call attention to the Milwaukee, a comparatively new apple, fruiting for the first time in Ottawa this year. I think it will keep in good condition till the first of February, and I think it is a heavy bearer. It is a seedling of the Duchess. It is an acid apple.

The CHAIRMAN: I would like to ask Mr. Whitney how he would propose to

thin fruit in the blossom. I think that is one of the most important questions we have before us in regard to fruit growing. Our plum trees and many of our trees set two crops instead of one, and very often the tree is ruined by growing too heavy a crop. If we could control it in the blossom I think it would be a grand thing for fruit growers.

Mr. WHITNEY: I think it is not a very difficult matter with one pair of proper shears to go through the tree and clip out certain spaces just as little as of the twig as possible, just the blossom, and a man would go through a large number in a day. There is a great advantage in thinning the blossoms instead of the fruit, because if you let the fruit grow to the size of a walnut or hickory nut it so far exhausts the tree and exhausts the fruit buds that are then forming for the next season; and it seems to me if it costs more to do it in the blossom that it would pay, because it would be less exhaustive to the tree. I think that would be a strong argument.

Mr. GRAHAM: Would it not be well to have extra pruning? Has it not been stated that to produce a blossom was very hard upon the tree, even as bad as if it was killed by frost?

Prof. MACOUN: The thinning would consist in killing the blossoms. You do not know beforehand what kind of a crop you are going to get. Sometimes flowers set very well, but you do not know how the fruit will turn out.

The CHAIRMAN: Very often the heavier the bloom the less the fruit.

Mr. PATTISON (Grimsby): I have always understood that it was the ripening of the seed that was the strain on the tree.

Mr. CASTON: This was advocated both in the United States and here in our horticultural journals. Perhaps Mr. Powell can give us something.

Mr. POWELL: The question of thinning has been very carefully experimented in New York State, particularly at our experiment stations. So far the effort has been confined largely to thinning the fruit, and while the expense is considerable, yet in every experiment that has been tried it has proven to be an exceedingly profitable operation. When the fruit is set, then you have the entire control in your hands. You can detect much of the defective fruit, and with the same clippers or shears that you would prune the blossoms you can prune away the defective fruit and leave your finest fruit upon the tree. There, I think, would be the advantage in pruning away the fruit rather than the blossom The point that was made by the gentleman in relation to pruning is a good one. I think we fail very much indeed in sufficient pruning of our trees. By judiciously cutting out each year all the different varieties we can maintain a better uniformity all through the trees in the distribution of the fruit upon the tree. Now we are carrying too much wood. There is too much vitality expended in carrying wood upon our orchards. We could save by judicious pruning, thinning out, more properly cutting out, and thereby reducing the expense of thinning out, by a systematic judicious plan of cutting away the wood. I think one reason of our failure in plums is that they set altogether more than they can possibly carry. Now, if we would reduce perhaps from a quarter to a third of the wood in each of our plum trees we would save that very heavy drain on the trees, and we would get stronger, more vigorous, healthy trees that would carry a much finer quality of fruit. I think that the judicious pruning of the wood is one of the first and most valuable things to do. Then after that go through with the pruning shears and take out as far as possible all defective fruit. (Hear, hear).

Mr. TWEEDLE (Fruitland): I agree very heartily with the remarks of Mr. Powell on that point. I believe that the great amount of surface at the time of the bloom requires a great deal of vitality to keep it in perfection and set its fruit; and I think we have an old saying that the heavier the bloom the less fruit we have, and experience seems to bear that out in my case. Last year I

had an orchard of pears, a perfect sheet of white. We only got 40 baskets off 120 trees capable of bearing half a dozen baskets each tree. It seems to me it defeated itself, although we pruned it considerably. I think the pruning ought to be done earlier. If we cut off the bloom we are cutting off some of the vitality, as Mr. Powell has said. I recollect leaving some plum trees in the nursery till after the delivery season was over, and then we headed them back and the consequence was in the fall those trees did not weigh more than half what they did, and any person could go along and tell the difference in the weight as well as the growth. They were light and without sap. The late pruning had destroyed all the vitality of the trees. We had cut it off; it had gone. It was expended in the top of the tree, and to a great extent destroyed the whole growth. We want to do a large part of our pruning in the orchard early in the season. A great deal of pruning in our section is done by climbing up a ladder and getting around the inside of a tree and cutting out large branches and not cutting out the proper part of the tree. We do it by a different plan. We take our horse and rig, and with a platform we take our pruners and saws and get right out under the part of the tree that is bearing the apples, and thin out smaller branches, twigs, all through—thin out so that there is no branch nearer to its next neighbor than a foot or so. In that way we prune where we ought, and get the light and air through the bearing part of the tree. Then, I believe, in leaving the fruit in the crotch of the tree so that we don't have a lion's tail out on the branch. We might as well have our fruit distributed down the centre of the tree, and get a great deal more fruit without destroying the tree.

GEO. E. FISHER: I would be glad if Mr. Tweedle would give a date at which in his opinion apple trees should be cut.

Mr. TWEEDLE; I would prune about the latter part of March or the first of April in our section in order to get the best results.

Mr. MORRIS: I think a full session could be devoted to this subject. I differ from the last speaker as to the time of pruning. About the first of August the growth of the tree is about at a standstill; you thin it then and you have more fruit-buds, and more healthy buds. I would not thin out the big branches, and make long slender branches with an open centre, as I have often seen people do. A year ago I saw a full orchard destroyed by a man who knew nothing about pruning. He sawed out the large limbs through the top of the tree, left them all open, with the result that the sun came and struck the tops of those large limbs and killed half of them, and I believe almost destroyed that orchard for good. My plan of pruning, instead of taking out those large limbs, would be to cut them back on the outside. Keep your trees more compact, and run them up if you will, but do not let them spread out in long limbs and leave the sun get down to your big limbs on the inside. Even if it does not kill the bark right through, it has a tendency to stop the free flow of sap, and injures the tree very much. I remember some years ago that I read in the *Horticulturist* that May and June was the proper time to prune trees. I will just state that you cannot put a ladder or step on a limb in the month of June but what you are loosing the bark and causing a dead spot right there. It is all right if you can do it from the ground, but you must not step or put anything against a limb at that season of the year.

Mr. WHITNEY: I think the whole matter hinges on when the fruit-buds are formed. I think they are formed about the time the green buds begin to start.

Mr. JONES: I have tried to watch the development of the fruit-bud of the apple the last three or four years as carefully as possible, and as nearly as I can follow it, it commences to be built up shortly after the foliage unfolds in the spring. In our district that is about the first week in May; and I find that by the 20th or 25th June, or 1st July, that the fruit-bud for the next year seems to be fully built up in all its parts. But then if you take the bud and roll it in your

thumb it will roll right out; it is full of sap. It is fully built up, but is not ripened at all, and it seems that from the 1st July until the middle of September that the bud is ripening and drying out and getting hard and firm, getting free of sap so as to withstand the frost of the coming winter. If you take a bud off a tree now you will find it is quite hard, and if you rub it between your fingers it will roll—you can't crush it down, and it is quite dry, you could cut it in two with a knife and then roll it out. I think I am correct in my observation, but I have had no one to help me in the matter.

The CHAIRMAN: This matter is very interesting, and I would like to hear another half hour's discussion, but time forbids. I would like to say that in regard to grapes growing on the St. Lawrence Mr. Whitney missed a grape that probably would suit him better than any others, that is the Worden.

Mr. WHITNEY: I have the Worden, but really forgot to mention it.

Mr. CASTON: Is it ten days earlier?

The CHAIRMAN: Yes, I think every grower here would bear me out in that and it is a very good grape.

PEARS FOR THE PROFESSIONAL AND AMATEUR GROWER.

BY E. C. BEMAN, NEWCASTLE.

Pears adapted to the use of the professional and amateur grower, call for entirely different qualities. The professional grower is growing for profit, and the varieties must be adapted to that purpose. The tree must be a fairly good grower, sufficiently hardy and healthy to endure the climate and also productive. The fruit should be of good and uniform size, fine showy appearance, and of fairly good quality. It is also advisable to select varieties that are not subject to spotting or scab and other diseases.

On the other hand, the amateur grower wants, first of all, superior quality and handsome appearance, size is not usually taken into consideration. Of course if you can have all the other good qualities, of large size, beautiful fruit, hardy, healthy, productive and early bearing trees, you are that much better off, but you want quality first and last.

In this paper I shall not give any details regarding the planting, cultivation, or management of the orchard, but confine myself to a short discription of the most valuable varieties suitable for each class that have proved successful in my own orchard, and that are adapted to this part of the Province of Ontario.

There is one thing to be taken into consideration in selecting varieties for planting, and that is the variation in quality on different soils and situations. A variety may succeed on one farm and be a failure on the adjoining farm, and consequently it is not advisable to plant largely of any variety until you have tested them on your own soil or know them to succeed on adjoining land and under similar conditions. The only sure way is to test for yourself, but unfortunately it takes nearly a life time before one can fully decide what to plant.

In the following descriptions I have placed each class in their order of ripening:

MARKET VARIETIES.

Clapp's Favorite.—Tree, an upright, vigorous grower, becoming spreading when it commences to bear; shoots require shortening back when young, or branches will become too long to make a good top; hardy, but subject to blight; very productive. Fruit, large and uniform in size, and evenly distributed; obovate ovate pyriform, pale greenish yellow, with dull crimson cheek, becoming

a lively red as it ripens up. Flesh, exceedingly juicy, fine grained, with a very agreeable slightly acidulous flavor. Season, first of September. A very good market fruit, but must be picked as soon as full grown and before fully colored, or it will rot at the core.

Bartlett.—Tree, an upright, but not very vigorous grower; healthy, but not very hardy; succeeds best when top grafted on some hardy, strong growing stock; exceedingly productive, in fact is almost an annual bearer; requires heavy manuring. Fruit, large obtuse pyriform, clear pale yellow, occasionally a pale blush on the exposed side. Flesh, very juicy, fine grained, melting; sweet, with a rather peculiar musky, agreeable flavor, fine for both dessert and canning. Season, first to middle of September. One of the best pears for home market, and fine for export if picked early and properly handled.

Duchesse Precoce.—Tree, an upright grower, healthy, fairly hardy, exceedingly productive; commencing to bear very young, consequently the trees do not grow large, and will probably be short lived. Fruit, resembles Bartlett in size and color, but slightly longer in form. Flesh, juicy, melting, with a slightly acid flavor, not of the best quality for dessert, but very fine for preserving. Season, a week later than Bartlett. A comparatively new variety, originated in France. Although not very high in quality, yet on account of its fine appearance and enormous productiveness it makes a very profitable market fruit.

Boussock.—Tree, a vigorous, spreading grower, healthy and hardy; moderately productive, but not an early bearer. Fruit, large, roundish obovate, deep yellow and russet, with a warm red cheek. Flesh, juicy, melting, sweet, agreeable flavor. Season, end of September. A very showy fruit, but not quite productive enough to make a first-class market fruit.

Howell.—Tree, an upright grower, healthy, moderately hardy, productive and an early bearer. Fruit, large, obovate pyriform, pale yellow, occasionally shaded with red. Flesh, juicy, melting, pleasant, slightly acid flavor. Season, first of October. A very good market fruit.

Goo ale.—Tree, a vigorous, thrifty, upright grower, healthy, hardy and productive. Fruit, large, oblong obovate, greenish yellow, shaded with reddish brown. Flesh, juicy, melting, sweet agreeable flavor, a little gritty at the cores Season, middle of October. A very good and profitable market fruit.

Bosc.—Tree, a vigorous but irregular grower, moderately healthy and, I think, quite as hardy as the Bartlett; productive, fruit evenly distributed over the tree, generally only one fruit on each spur, in place of clusters, as is common with the pear, ensuring nearly all fine specimens even in size and form, and free from blemishes. Fruit, large, acute pyriform, dark yellow, mostly covered with cinnamon russet, with occasionally a light touch of red on the sunny side. Flesh, melting, buttery, with a rich, delicious, slightly perfumed flavor. Season, middle to end of October. A very beautiful fruit, fine in quality, one of the best for home market, and will probably be one of the best for the foreign market; should be top grafted on a strong, hardy stock.

Anjou.—Tree, fine vigorous, spreading grower, healthy and hardy, but not productive. Fruit, large, obtuse pyriform, greenish yellow, shaded with brownish red. Flesh, juicy, melting, with a pleasant vinous flavor. Season, November. Fine for both home and foreign market, but too unproductive to be profitable.

Keiffer.—Tree, a very vigorous upright grower, healthy and hardy; a very early bearer and exceedingly productive on account of its early bearing and great productiveness; will probably not be long lived. Fruit, medium size, ovate in form, golden yellow, with bright red cheek and russet dots. Flesh, half melting, juicy, a somewhat peculiar sweet but poor flavor; gritty at the core; too poor for dessert, but fine for preserving. Season, November and December. On account of its great productiveness and beauty, it may for a time prove to be a profitable market variety, but I am inclined to think that when its poor flavor

becomes better known it will not bring as good returns as it does at present. It has one bad fault: after coloring up and coming to maturity, the skin rapidly changes to a very dark and spotted color, giving the appearance of decay while still sound.

Winter Nelis.—Tree, a moderate but irregular grower, branches slender and straggling; healthy and hardy, productive; succeed best when top grafted on some other good growing stock. Fruit, small to medium, roundish obovate, yellowish green, nearly covered with russet patches and streaks. Flesh, fine grained, juicy, buttery and melting, with a rich, sweet, aromatic flavor. Season, December to January. When the soil is suitable and it can be grown to a fair size, it makes a good market variety, usually brings good prices and is about the only really good winter pear.

Amateur Varieties.

Doyenne D'Ete.—Tree, a moderately vigorous grower, upright, slender branches; hardy, but subject to blight; an early and abundant bearer. Fruit, small, roundish, obovate, yellow, shaded with a red streak on the sunny side. Flesh, juicy, melting, with a very pleasant, sweet flavor. Season, end of July. This little pear is well deserving a place on the amateur list, as it is the first to ripen, and although small and not of the highest flavor, yet being the first of the season to ripen, is usually much enjoyed.

Ott.—Tree, moderately vigorous; stout short-jointed branches; very productive. Fruit, small, roundish obovate; greenish-yellow, some russet, shaded with dull red. Flesh, juicy, melting, sweet, rich perfumed flavor. Season, August. A seedling from the Seckel, a very fine dessert fruit.

Clapp's Favorite—Described under market varieties.

Tyson.—Tree, a very vigorous growth, taking on a fine pyramidal form, very healthy and hardy, a very fine tree to top graft weak-growing varieties on; requires age before it commences to bear; moderately productive. Fruit, small to medium, ovate pyriform, deep yellow with crimson cheek. Flesh, juicy, melting, very sugary, slightly aromatic flavor, very good to best. Season, middle of September.

Bartlett.—Described under market varieties.

Seckel.—Tree, moderately vigorous, healthy and hardy, productive. Fruit, round obovate, dull brownish yellow with reddish brown cheek. Flesh, juicy, melting, buttery with a very rich spicy flavor. Season, October. The Seckel is generally considered to be the highest and richest flavored pear grown and is a standard of quality by which other varieties are very often measured. Originated near Philadelphia.

Sheldon.—Tree, a vigorous upright growth, hardy, somewhat subject to blight, requires age before commencing to bear, only moderately productive, should be gathered early as it is much inclined to blow off. Fruit, medium to large, obtuse obovate, greenish yellow, nearly covered with thin russet, brownish red cheek. Flesh, very juicy, melting, sweet rich vinous flavor, a little gritty near the core, very good to best. Season, October to November.

Bosc.—Described under market varieties.

Lawrence.—Tree, a moderately vigorous grower, forming a round spreading top, healthy, hardy and productive. Fruit, medium size, obtuse, pyriform, lemon yellow with occasional patches of russet. Flesh, juicy, melting, sweet, aromatic flavor, very good in quality. Season, December.

Dana's Hovey.—Tree, a vigorous upright grower, healthy, hardy and productive. Fruit, small, obtuse pyriform, greenish, yellow, netted and patched with russet. Flesh, juicy, melting with a very rich sweet aromatic flavor, best, nearly as good as the Seckel. Season, December.

Winter Nelis.—Described under market varieties.

Josephine de Malines.—Tree, a moderately vigorous spreading grower, productive. Fruit, medium in size, roundish oblate, pale greenish yellow, netted and patched with russet. Flesh, a delicate pinkish tint, juicy, melting, sweet with a delicate aromatic flavor, very good to best. Season, December to February. On young trees the fruit is occasionally poor and astringent, but becomes much improved as the trees advance in age and is then one of our best winter dessert pears.

Jaminette.—Tree, vigorous upright grower, healthy, hardy and productive. Fruit, medium to large, roundish obovate, clear green, becoming yellowish green at maturity, marked with russet patches. Flesh, juicy, buttery, sweet pleasant flavor, gritty at the core. Season, January to April. Although not of the best quality, it is a good variety to finish up the season with, by keeping in a cool cellar and bringing a few at a time into a warm room, they can easily be kept in use until April. I have not found late keeping winter pears very satisfactory. So far the Jaminette is the only one I have found desirable, as a late winter dessert fruit.

Mr. BOULTER: Pick out three of the best varieties of pears for general purposes—to bring in money?

Mr. BEMAN: I would take the Bartlett, the Duchess Precoce, and then Bosc.

Mr. BOULTER: You would throw the Flemish Beauty over entirely?

Mr. BEMAN: Entirely—too much inclined to spot. The Anjou is a very shy bearer; with me it is almost worthless.

The SECRETARY: You do not grow it on the dwarf, do you?

Mr. BEMAN: No, I was not very successful in growing dwarfs.

The SECRETARY: The Anjou is far more productive on the dwarf.

Mr. BEMAN: So I have understood, but I did not succeed very well with the dwarfs. I do not recommend any dwarfs for my locality. I have not seen any dwarfs that have succeeded so far.

TOP GRAFTING AND IRRIGATION.

By J. I. GRAHAM, VANDELEUR.

The subjects of top-grafting and irrigation was brought to my attention when I undertook to collect the fruit of our township for exhibition. In passing from orchard to orchard I was surprised to see the amount of poor, worthless fruit, and so many poor fall varieties I estimated there was over one-third that was worthless, and our local buyer told me that between a third and a half were fall varieties. When the buyer comes around he is told that he must buy these with the winter fruit, and that holds the price of the winter fruit down. I have been top-grafting for thirty years; I have a hundred varieties, and I am satisfied you can increase fertility by top-grafting; I refer more especially to the King. The Baldwin with us is considered tender, but where it is top-grafted it does not show the least sign of tenderness. For stocks, I find the common seedling is good, and I have found the Spy poor stock to top-graft; so also is the Baldwin and the Golden Russet. I have quite a number of varieties here, some grown on the original stock and some on top-grafts, which you may compare. But I have not noticed the differences referred to by Prof. Sears in the last *Horticulturist* in respect to the stock affecting the colour, keeping and taste of the apple. I have had success with the following grafts:—Hurlbut and Gideon on Ben Davis; Baldwin and King on seedling stocks; Hurlbut on seedling; Fallawater and Peck's Pleasant on Little Red; Cooper's Market on seedling stock

and on original stock; Spy on Crab stock and original stock; King on Ben Davis; Baxter on seedling; Yellow Bellflower on seedling; Hubbardston's Nonsuch on seedling and original stock; McMahon White on Fall Pippin; Baldwin on Rambo; Ribston Pippin on Little Red; Gravenstein on seedling. For scions, I am a strong believer in the individuality of certain trees I have noticed that in the Spy, the Pewaukee, and the Cayuga Red Streak. In a row of Spy trees there is one tree much earlier, much redder in color, and much earlier to bear. In the Pewaukees I noticed that one was of much higher color than the other; and I have noticed it in the Cayuga Red Streak so much that I asked one of the exhibitors to let me have one to send to Prof. Macoun to see if it was really that variety, and he replied that it was, but a remarkably good specimen of that variety. It is usually recommended to take scions from bearing trees. In taking off the top I would remove from one-third to one-half at a time. You must be careful not to expose the branches to the sun. I have quite a number, having a strip down the south side killed in that way. If you have not left sufficient foliage, you should use paper to cover the exposed portions. I would not cut a branch over two inches in diameter. If the trees are high I would use Ben Davis or Ontario—that is, if the apple suited me—to keep it lower. You have it much under your control by the variety you put upon it. Should you put Spy on a high tree, you are still running it up higher. If you require spreading, the Rhode Island Greening will spread. Should you come to a stock that is damaged, as I have done, and had doubts whether to graft it, I would graft it with an early-bearing variety. The Ben Davis will come into bearing the second year. In top-grafting, if you observe, you will learn a lesson on pruning that will be of use to you. It is a mistake, often made, to put in too many grafts. If a man is putting in for money, he will put in all he can, and if you have not knowledge you will sometimes put in too many yourselves. You should not have too many branches on a tree, but it is not good to cut off a large branch near the trunk. I need not speak of the waxing—you all know how it is done. In the summer I would re-wax them, or press it over again when the sun is warm. I would not have too many varieties; four to six I would consider quite sufficient for a commercial orchard. The varieties that suit me are: King, Spy, Baldwin, Rhode Island Greening, Ben Davis and Mann.

Irrigation.

The other subject is irrigation. My farm is on a mountain side In that valley, and at the base of the rock just under the brow of the hill, there come out little streams. These I run together and lead them across the orchard, and use them for irrigating the orchard and fields and the garden; also for power in the barn. I simply have to put stones in the ditch and it overflows and goes right down between the rows of trees whenever I want to water. Every year there is a month or two during which I find it necessary to irrigate. The ground is clay soil, and it would crack quite large cracks if not irrigated.

The Chairman; Are there many seasons during which you irrigate there?

Mr. Graham: I do it every season. There is usually a month during harvest season when it is dry. I irrigated the rows of trees, and I had a splendid crop of fruit. It is hard to say how much I should attribute to the water or the manure or the pruning, but I am well pleased with the returns. Some years ago someone asked Prof. Craig why it was the apples were rotting so badly that year, and his answer was that it was caused by the starting or stopping of vegetation—the checking of it by drouth and then starting of it by rains—and I noticed that year that my apples kept splendidly in the cellar. This year I was told up north that fruit would not probably keep well, Mine is keeping splendidly in the cellar.

The SECRETARY: Would you tell us any results of irrigation in the fruit itself—in its size or quality?

Mr. GRAHAM: Yes, even the Ben Davis. The water there is running the year round. At that end where the creek has been running all the year the apples were nearly a half larger than at the other end of the rows. The Spitzenbergs were loaded much heavier near the creek than they were last year.

Mr. BEALL: Do you cultivate your ground through the growing season?

Mr. GRAHAM: No, I keep hogs in it, and when the water is in it it softens it, and they do quite a bit of cultivation. The fruit business is an important one in our district. It is estimated that at Thornbury some $80,000 has been paid out during the season for fruit.

Mr. CASTON: There was one important point in Mr. Graham's paper, about the individuality of trees. I was very much interested in Prof. Sears' article. The question is, what effect it will have on the fruit by taking scions from a fruit that has a certain individuality about it, and also from a particular part of the tree? I sometimes have a tree that will bear heavily on one side and have no crop on the other. We often see that on the Northern Spy. The idea was to take our scions from the bearing side of the tree. We know how we can improve grain, vegetables, roots and that sort of thing by judicious selection. Could we not carry that out in fruit growing? I think there is a great idea there. It is said nurserymen take their scions indiscriminately. In top-grafting can we accomplish nothing in that line? I think that idea is probably new to the oldest fruit growers here—carrying out the individualities by top-grafting, as regards productiveness, color, early bearing and all other things that constitute a good fruit.

Mr. POWELL: I may say that that was the very thought I had in my mind to discuss here for you at perhaps this afternoon's session. I have been working a number of years on the same line as this gentleman, and I think it would be perhaps as important a line to discuss as could be taken up. (Hear, hear, and applause).

Prof. MACOUN: I would like to warn the fruit growers about top-grafting on Wealthy and Duchess. We have tried it, with the result that after several years those that had been top-grafted had outgrown the Wealthy and Duchess, and I expect we will lose the trees in a few years. There is a marked difference when you see the trunk very much smaller in proportion than the top. We are starting a series of experiments in top-grafting at the farm in Ottawa, and we are using the Haas, Mann and Crystal White as stocks, and I propose to use the MacIntosh Red as a stock; it is one of the cleanest trunks we have. I propose to graft them on seedlings of the Martha Crab, and then Rhode Island Greening on top of that, and I think we may be able to get some of the tender varieties to succeed with us.

Mr. MORRIS: I think the Professor will find if he buds the Crab it will houlder.

The SECRETARY: Has Prof. Macoun tried the Keiffer pear as a stock for other pears? Many of us will be inclined to graft our Keiffer pears to some other variety.

Mr. POWELL: For several years I have been working on Keiffer stocks with the Anjou and the Bosc. I have not attempted other varieties, but have been very much satisfied with the working of these two varieties on the Keiffer. There seems to be a perfect union, and it is a question which is raised as to whether the union will be perfect between other varieties and the Keiffer; and I find that in that respect the union is perfect, and I cannot see why the trees will not last well on toward a century, The Anjou is one of our most valuable pears, but very uncertain in its productiveness. Many orchards will stand for twenty years and show no fruit, and yet you take the Anjou and top-work it, or

the Keiffer, and my experience is it becomes one of the most prolific bearers. I have had it now nine years, and every year it is necessary to go through and thin the fruit, it sets so heavily of that magnificent fruit. There are just one or two points necessary in top-working the Keiffer stock. One of my neighbors, a very successful fruit-grower, has met with absolute failure in all his efforts, and I think he has made a mistake in cutting off the entire top of his Keiffer stock at one time. It is a very vigorous grower, and there must be some provision for the flow of sap in the Keiffer stock, otherwise there is a danger of failure; but my plan was this: the Keiffers were set as two year old trees, and allowed to grow one year; then I inserted only two grafts the following season. The next year I would cut off another branch, and the third year would finish the top-working. That left some Keiffer all through the period of changing the tree. The result is that when I had finished the third year the Keiffer wood was all removed, and I had my Anjou stock well established, and good strong top also from the scions that were set. Now in this case there was no check at all given to the tree, and the union has been perfect, and you can't see to-day where the grafts were set. The Bosc I think is a little more difficult, because the Bosc is not so rampant a grower as the Anjou; but I have met with excellent success in top-working the Bosc also from the Keiffer, and have to-day fine trees that are bearing annual crops and of the very finest quality. Now as to the other varieties I have no experience, because I limit myself to very few varieties for market purposes. Our friend Mr. Willard whom you have had the pleasure of having before your Association, has been writing me in reference to the working of the Bartlett pear upon the Keiffer, and I cannot say whether the union will be as perfect with the Bartlett as with the other varieties or not; but if this principle is used in working the tree over gradually, not all at once, I see no reason why there might not be a good union with the Bartlett or the Seckel, or any other variety that might be worked. There is where the important point comes in: do not cut your stock away all at once; take time, and I think you will be entirely successful.

Mr. SMITH: Can that rule be applied to all?

Mr. POWELL: I think that will apply in all cases, but you will not meet with the failures with the Keiffer that you will with others.

Mr. SMITH: Is not the Anjou a coarse feeder?

Mr. POWELL: It is; it will require a great deal of fertilizer. It also requires about as much room as a Baldwin apple tree. They are naturally a very large-growing tree; the roots and the branches spread so that we ought to set Anjou pears at least 35 feet apart. With me the Anjou has proved a healthy, fine, vigorous grower, with good foliage also.

Mr. MORRIS I would like to say one word with regard to pruning pears. The pear tops should be kept cut off, not allowed to go up in air, for then the wind takes hold of them and blows them down, and when a tree leans to the north-east the sun will strike the stem of that tree and it is going to die. There are more trees killed by the sun getting at the trunk than there are by blight.

Mr. GEO. E. FISHER, Burlington: I find the Anjou does not bear. I have a lot of trees, and some of them are large enough to have had 30 barrels, and they did not bear scarcely anything. How would it be to graft those trees with Anjou?

Mr. POWELL: I think the Anjou would be very much benefited by top-working. In a case like yours where they do not show productiveness, the very fact of cutting off your trees, even after they have stood ten years, and even setting Anjou upon Anjou, I think the effect would be to give you fruit on those trees. The tendency of the Anjou is to make wood; it is a wonderful wood producer, and the vitality seems to go to wood. Now, the checking of that by top-working would give you fruit.

Mr. PATTISON: Would not the ceasing of cultivation have the same effect?

Mr. Powell: I hardly think so, because I do not believe the cultivation is detrimental to the tree at all. I think it is necessary. High culture I think is very desirable; but we must in some way give check to this wood-bearing tendency. And I think think there is no way so effectual as top-grafting trees after they have stood for a few years. My experience is on the Keiffer stock, they have been exceedingly productive.

Mr. Pattison: Have you had any experience with Sheldon?

Mr. Powell: I have not grown the Sheldon, because it is so prone to drop its fruit. The winds, when they strike a crop of Sheldon, lay such a large proportion on the ground that I have not planted the Sheldon tree. Another point is, the Sheldon is not a popular fruit in the market. It is not appreciated, although I think it is one of the choicest and finest varieties of pears; but its color is against it, and its shape also is undesirable, and so I have avoided planting it.

Mr. Smith: I think that is a question that ought to be taken up, to educate the people to the use of the different kinds of pears.

Mr. McNeill: Although we have no representatives to speak from the affiliated horticultural societies, we must not estimate their work by the amount of talk we have had from them. It is an exceedingly important work, and it has done more, perhaps, than any single advance that has been made by the management of the society for the extension of horticultural knowledge, and for fulfilling the objects of the Provincial Association. Their work has been a decided advantage to the Province; and wherever there is a Horticultural Society located its influence is felt to a very large degree, and the Province owes a debt of gratitude to the managers for so faithfully following out the lines of work laid out for them by Mr. Thomas Beall of Lindsay, who is so intimately associated with them, and to whom so great a share of the credit is due

The Chairman: The Secretary has some correspondence on the fraudulent packing of fruit which he will read.

The Secretary read letters from S. Nesbitt, Brighton, W. E. Wellington, London, England, bearing on the subject. He also called attention to two baskets of apples on the table—one basket taken from the centre of a barrel of apples that had been packed for export, and the other of apples with which it was faced at each end.

HOW CAN WE PREVENT TRICKERY IN THE PACKING OF APPLES FOR EXPORT?

By A. H. Pettit, Grimsby.

This is a subject that has been discussed by our fruit growers for the last twenty years, and we have as yet failed in agreeing on any definite steps that might be taken. Now, I don't think you can pass any legislation to make a man honest. You may correct some evils, you may improve the quality of our fruit by cultivation, by pruning, by spraying and by thinning, and thus get rid of a large proportion of this unsalable fruit that is being placed in the centre of barrels for the British market. We all know that the growers of this country have more or less inferior fruit. They are going to market that product, and they have a right to market that product, and I don't believe that any legislature or any government can pass a law to prohibit them doing so. But if we can raise public opinion to the point that it ought to be raised, then I take it we can reach the only feasible plan. For years I have advocated and urged that a system of inspection be adopted for apples. The point then asked was that the Government appoint an inspector to inspect such fruit as was offered for inspection. I do not believe that we can make a compulsory law that all fruit shall be inspected, but we can place it within the reach of a man who wishes to make a

contract for the British market, for example, to have the inspector see that the goods shall be up to the standard marked upon the barrel. If it is marked " No. 1 " that barrel shall contain No. 1 apples ; if it is " No. 2 " that it shall contain a certain grade of apples as set forth in that Act. Who is doing this fraudulent packing ? Is it the fruit grower of Ontario ? I do not believe it is. It is the speculators who buy very large quantities ; and when a man undertakes to cover such a large scope of territory and to handle such immense quantities of fruit, it is impossible for him to get men well enough posted to go about the country and put up those apples in the condition they ought to be put up Now, I do not think any buyer or shipper desires to have his apples put up badly, and if the Inspection Act was carried out, proper inspectors appointed at ports of shipment, and, if we could have local inspectors to inspect and brand those barrels before they leave this Province at all for the British market, then you would begin to work up the standard of Canadian fruit for market.

Now, I believe there is no country in the world that can produce better fruit than we can in the Province of Ontario, so when the growers do not pack their fruit properly it is a discredit to us all in the British market, and an injury to our business. I made a little estimate this morning, taking 300 barrels as an easy basis for figuring. Taking this year as an average price for Canadian fruit, the average in the British market will not exceed twelve shillings a barrel, which would be $900 realized on the 300 barrels. Counting the packing and shipping of the apples at 15 cents a barrel, and barrels themselves 27 cents, freight and commission $1.10 per barrel, a total expense of $236, the shipper will receive net $664 for his 300 barrels at 12 shillings a barrel. Now, let me take out 100 barrels, sorting them out more carefully, and put up 200 barrels at 15 shillings a barrel—that is a moderate estimate ; that will be $750. Deduct the same proportion of expense, $79, and this will leave the shipper $671, instead of $664 for 300 barrels, or a margin of profit that is as large by putting 200 barrels through in this condition as the 300. Now, he has 100 barrels or 300 bushels of good apples for the evaporator, apples that will bring him to-day in our market here from 25c. to 30c. per bushel. He can get that after he has taken out his seconds, all excepting the ciders ; but by putting this 100 barrels of seconds with his peelers, he will run the peelers up to 30 cents a bushel—we will put them at 25 cents a bushel, which will give him $75. He will then get $746 for his 200 first-class barrels and 100 peelers, instead of $664 on his 300 barrels. Now, besides all this, there is a great deal of waste of energy, a great deal of waste of labor, and a great loss of credit. I believe if we look at this thing properly we will make more money by working along these lines than we will by shipping such stuff to the British market ; and I believe, more than that, that we can establish in our country a great market for evaporated fruits, and the more we can do to encourage this business and manage to dispose of the product in this country, the better for us. I was not prepared to deal with so important a subject to-day ; I have not come here with any prepared ideas on the matter, but I will submit this point : that I believe a system of inspection—a voluntary inspection for those who wish it—would be a step in the right direction to have carried out ; and I believe that thorough inspection at the port of shipment, where possible, and also in fruit-growing sections of the country during fruit season, will accomplish a good work and begin to establish in the British market Canadian-inspected apples as the best in the world. I get a great many catalogues of the sales of fruits of the United States, as well as the Canadian, and I fail to see that there is very much difference except in the barrel. I believe the American barrel is slightly smaller than ours, holding about a peck less, and the prices, as a rule, run about that peck less in value ; therefore, I believe there is very little difference in the standard of packing.

The CHAIRMAN : We would be glad to hear from Mr. Carpenter in reference

to these two baskets of apples. I do not think the farmers put up those apples, and I do not think the dealers are doing it blindly or without instructions.

Mr. CARPENTER: Before I left home, I suggested that it would be a very good idea to send a sample of these apples down here so that people could see what stuff was being packed; so I suppose they took the suggestion at home and sent them down.

I can't say those apples were packed for export, but one would suppose so, because they were labelled XXX, and with the best brand the man put up. They were sold to me for No. 1 apples, in fact XXX, as represented. I opened one barrel of Baldwins and it was supposed to be No. 2, and it was a fair No. 2 barrel of apples. I did not have any time at my disposal just then, but I thought the No. 1 would be quite satisfactory, as the No. 2 were fair. By a strange coincidence, there were five of these barrels left out of my shipment; they were taken down to my place and opened up, and they were five barrels of the vilest trash that ever was put in barrels. If they had simply been shovelled up they could not have got in worse trash. By a peculiar coincidence also, the man who was selling the apples made an error of $19 in my favor, and I thought he would write for it when he got home, but he didn't, and needless to say he will never get the $19. I have not any suggestion to make, for I have not studied or thought out what would be a good way to obviate this difficulty, but no doubt one way would be to put up fancy packages of apples.

Mr. CASTON: You say you did not buy those for export?

Mr. CARPENTER: No, I buy very few for export, a few car-loads perhaps, but I sold these in Ontario. The English market is so uncertain that where we can sell here for any reasonable profit I think it advisable.

The SECRETARY: I think it will be in order to read a resolution that was passed by a meeting of fruit growers in Grimsby on the 17th of June, looking to legislation in this matter, which resolution was forwarded to Ottawa and a favorable reply got from the Minister of Agriculture for the Dominion.

Resolved, That both the Dominion and the Provincial Legislatures be asked to consider the advisability of legislation to carry out the following regulations for the sale of apples and pears:

1. That all apples and pears packed for sale in closed packages shall have the minimum diameter of the fruit inside marked in plain figures on the top or face of the package, thus—2 inches, 2¼ inches, 2½ inches, etc, as the case may be, and if more than ten per cent. run below the size specified, the package shall be considered fraudulently packed.

2. That all such packages shall also be stamped with certain grade marks which shall be defined as follows:

(*a*) X A No. 1. Sound apples or pears of uniformly large size and high color for the variety named, of normal form, at least 90 per cent. free from worm holes, scabs or other defects.

(*b*) A No. 1. Sound apples or pears of nearly uniform size and good color for the variety named, of normal form, at least 90 per cent. free from worm holes, scabs or other defects.

(*c*) No 1. Sound apples or pears of fairly uniform size, at least 80 per cent. free from worm holes, scabs or other defects.

(*d*) No. 2. Apples or pears that are disqualified from being classed under any of the aforementioned grades, but which are useful for culinary purposes, and not less than two inches in diameter.

3. That all apples or pears packed in closed packages be subject to inspection by the Government Inspector, and if, on opening one-tenth of the number of the packages of any one lot, these be found fraudulently packed, then the nine-tenths remaining shall be so classed, and the shipper be liable to a fine not exceeding 50 cents a barrel for all packages of that grade in the same shipment.

4. That provision be made for inspection not only at the ocean ports, but also at the request of the shippers, at local points of shipment in case of car lots.

5. That for local inspection a reasonable scale of charges be made of the shipper requesting it, guaged according to the number of carloads to be inspected.

6. That in such latter case the inspector shall apply some distinctive inspection brand to show that the packages had been inspected and found honestly packed; but, if found fraudulent, the inspector shall have power to forbid the shipment until properly packed and graded.

7. That in all cases the name of the packer and of the shipper shall be plainly stamped on the top of each package.

A. W. FARWELL (Oshawa): This is a vital point in our apple business. The whole profit in the apple trade lies in these two questions—packing and transportation. I know that there are apples shipped from Oshawa Junction that are put up the same as these. It is not done by the growers, but by the dealers. I have exported apples more or less for the last twenty years. I shipped the first car of apples that was ever billed straight through from Oshawa to Glasgow twenty-three years ago. Up to five years ago there was no dishonest packing done in our neighborhood; it was a straightforward business. The competition has become so great among buyers and they have become so anxious to gobble up the whole section of country that they go and buy up whole orchards by the lump. Previous to this we only bought what was shipping apples. We took what suited us, and we put up a good straight No. 1 apple and the farmer did what he could with the balance. Now the shippers take them to the fruit houses. There are four fruit houses at Oshawa Junction holding from 4,000 to 23,000 or 24,000 barrels each. The apples are picked off the tree, good, bad and indifferent, just as they come. They take them to the fruit house and they are sorted there. You can go into those fruit houses to-day and find barrels marked with the man's own honest name. You will see barrels in those fruit houses marked some other name that is not his name. Those that bear the real name are good apples every time. Those that bear somebody else's name or some factory's name are like those in the basket, and far worse than that. That is not a bad sample, for a small apple, at all. (Laughter.) I have shipped barrels of small apples to London before now, marked "culls," and got 16s. 6d. a barrel for them. There is no harm in doing that if you will mark them truly. If you send a good barrel of good apples, marked good, with your own name on it, all right, and if you send a barrel of culls so marked it is all right. But I contend it is all wrong for me to send a barrel with W. A. McBride's name on it, or Peter Dobson's name on it; and here is where I claim legislation should come in. I claim our Government has the power, and has the right to exercise it—to say that I shall not put somebody else's name on a barrel of apples for export. I make a good many thousand barrels a year for packing apples in. The Government says, "You shall make a barrel 17 inches diameter at the head, 27 inches between heads, 19 inches diameter in the middle, and if you pack apples in anything else then you will be fined 25c. a barrel." Why cannot they say that you shall put your name on it and guarantee what is in it or else you will be fined 25c. or 50c. or $1 a barrel? I do not believe there is anything in moral suasion in this matter; you may talk till you are gray-headed without doing any good When a man buys apples and mixes them up there is where the trouble comes in, and there is where the Government comes in and has to stop it, the same as they do the adulteration of milk and cheese. In those cases you have to stamp and sell it as it is; and when the Government tells the apple-packers they have to do the same we will have honest apples—and we never will before. (Applause).

The CHAIRMAN: That is just exactly the kind of information we want. There is something substantial in that; and I know there are men here who can give us a good deal more of just the same kind of evidence. I hope they will

feel perfectly free to do it. It is just what we want to approach the Government with.

Mr. CASTON: There is one thing I can hardly understand—the idea of packing those apples for export in that way, because in the Old Country the fruit is sold by brokers at auction, and they have a large basket; they take two barrels at haphazard and empty them out into that basket, and the lot is sold on sample. Now, if they happen to get hold of a couple of barrels like the sample before us, it will affect the whole shipment.

Mr. A. H. PETTIT: I quite agree with Mr. Farewell's idea in this matter; but how to reach them is the point at issue. I cannot agree that the shippers do this on purpose. It is because they can't control their packers. But the question I want to ask is this: A packer puts up his apples and he ships them with a through bill of lading to the British market; how are you going to interfere with his goods in this country? Can you step in and inspect his goods without his permission? He has a right to put those goods in the British market, and no person has a right to prevent him from doing it. How are you going to attack him? If you show me that you have a right to get at him, then I can see that legislation might be passed to check it.

Mr. FARWELL: I think we can get at him all right enough. Every shipment of apples is billed on a through bill of lading. There are three of those bills of lading attested to by the agent of the railways. He gives the shipper two. He retains one to be sent to the head office of the railway. Now, the Government can see that they make out four and send one bill of lading to the Department. Suppose the Government compels him to put his own name on every package of fruit he ships; they go through to Liverpool, and Shuttleworth & Co., or Woodall & Co., sell those apples to the retailer; they are opened up and they are found like this barrel. There is the man's name on the barrel. Word is sent back to Ottawa that such apples are a fraud The Department has the bill of lading there to find the very town the apples were shipped from. There is where you want your inspector. I know it is utterly impossible to inspect from ten to fifteen or thirty thousand barrels of apples down there in Montreal, suppose you had the power. How are you going to do it? When I ship apples in the winter I calculate them to get there just as late as it is possible to get aboard a steamer, and everybody else does the same. I have been in Portland when there were 257 cars of apples on the tracks, had to stay there three days, had to get a fire in the car to keep them from freezing. It has got so now that winter is the time of shipment, and every shipper times the arrival of his apples just as soon as the ship is ready to take them, and they are rushed in there night and day. How is it possible to inspect them? You might as well try to fly. You must do with it as you do with cheese. Turn to the criminal code. Every man is bound by his trade-mark, and if any man puts up his goods contrary to his trade mark then you can indict him. You cannot hang a man for shipping poor fruit. If he is fool enough to do it, and does not get the price for them, he will not do it more than once or twice.

Mr. MCNEILL: There is another difficulty in the way. As a fruit-grower, I would not trust those fellows on the other side with my barrels of apples. If I am not there, or my agent, to see that the barrels are bad, I would not take their word for it. There is another side to this story. A barrel is a different thing from a keg of cheese. When this apple goes over there I want some guarantee that the barrel that they say is a bad barrel, is certainly so. They say it is bad. I cant prove that it is not. We will have to—

Mr. FARWELL: Have a Canadian inspector over there.

Mr. MCNEILL: Of course if there was any means by which we could be perfectly certain that that barrel had not been tampered with—because it is an easy matter to tamper with a barrel, so that you still leave any label intact that

we put on, and yet it not be our fruit—but if there is any means of showing that the fraudently packed barrel had remained intact and the packer's name on it, then I would be in favor of his being punished.

Mr. PATTISON: The only way I can see to get thoroughly at the matter is to have an inspector at each station where the apples are shipped, although it involves more expense than I think we can manage. Then it could be easily found who shipped the bad ones and who shipped the good ones. Failing that, I think we cannot thoroughly get at the matter. In the one instance we are at the mercy of the man on the other side of the Atlantic; and although I come from there myself, some of their mercies are not very tender. (Laughter,) Whereas in the other case we are more or less at the mercy of the dealer, and his mercies are not quite what they might be either.

The CHAIRMAN: I would like to ask Mr Carpenter if the dealer's name, or any other name, or any other mark was on this barrel of apples?

Mr. CARPENTER: The dealer's name was on the barrel of apples in this case. I think they buy orchard's by the lump, and they want to make as much of the apples as they can, and they put the farmer's name on in the case of poor apples and let the poor farmer take the brunt. They come from W. A. Newton or D. A. Spears, or some one else, and the consequence is he has to foot the bill; so by the Government taking it up it would be a matter of protecting the farmer rather than doing him an injustice.

The CHAIRMAN: You got them practically from the man who packed them?

Mr. CARPENTER: Yes, but the man who packed them told me he packed them according to instructions.

Mr. PATTISON: Did he offer any excuse for the condition they were in?

Mr. CARPENTER: None at all; none.

Mr. EDWARDS (Peterboro'): Is this Association ever going to be strong enough, or is the Government going to be strong enough, to have representatives in England at the different points where apples are received, so that we may have a representative of our interests and the interests of Canadian sellers there? For it seems to me that that is of importance; and because of the statement that has been made, that it is desirable there should be an inspection on the other side, and there should be means of bringing home what is found on the other side back to the seller. That seems to be very desirable if it can be done. The difficulty, of course, is always in procuring the evidence and connecting the evidence with the seller; and the only way in which it can be obtained, and the interests of Canadians can be protected in connection with this great industry, is that either this Association or an association formed of those who are shipping, or better still, our Government, should have representatives at each port, and that they should look after all matters of that sort, and have means of bringing home every case of fraudulent dealing with the goods that are sent. Then, and then alone, I think, we can reach the trouble.

A. H. PETTIT: I may say that that is what we have at the present time—a gentleman on that side who is looking into the question in the interests of the fruit-growers of this country. This is the second year he has been in that position in the British market.

Mr. EDWARDS: With what result?

Mr. PETTIT: Well, no report has been published that I have ever seen, but I know that he is there, sent by the Departments.

Mr. EDWARDS: We should have heard something of it.

Mr. PETTIT: I know he does not speak very favorably of many of the fruits arriving in that country.

Mr. FARWELL: I am particularly interested in this point. It seems to me our Government should compel every shipper to put his name and address on every package of fruit he shipped, and with an inspector in each of the principal

receiving points in Britain all complaints of dishonest packing should be referred to him and he report on it. It seems to me you would then have control of the whole business. If a man over there buys a barrel of apples with my name on it, and he complains that it is not packed according to the stamp that is on it, the inspector goes and inspects that barrel, and probably all the rest. He may have bought a hundred, or three or four hundred, or may be three or four thousand, and he inspects different ones to see if they are up to the standard that they are claimed to be, and if he finds that they are like this barrel, or not up to the standard, then he reports to his Government. They, having the bill of lading, can look after him in twenty-four hours.

Mr. EDWARDS: It would be very easy, it seems to me, to connect the actual packer with the trade-mark and avoid the danger of the packer putting on the farmer's name on a barrel, and so endeavoring to hold the farmer responsible where he simply sold and the packer did the fraudulent packing, by providing that every one who is shipping should have his name or his trade-mark, or whatever it may be, registered at Ottawa, so that no name could be put upon any package but one which was registered at Ottawa, whatever it might be. when the packer would have to put his own name, and if the farmer's name happened to be registered the farmer would look after it himself and see that what was going on under his name would be protected.

Mr. MCNEILL: I went into one of the largest packing houses of Ontario—I hope I am not open to any slander—and saw apples packed just exactly like this one, and being a visitor there, by courtesy I could not of course get on a righteous indignation as I would anywhere else, and so with my sweetest smile I insinuated that it was not the style of packing that I thought best calculated to hold the English market; and he said, "Oh, these are not our packing; these are all ordered." I said, "What do you mean by that?" "Why," he says, "so many barrels of this brand are sold to the English trade." He afterwards explained that the English buyer bought these apples to be packed in this particular way. On my part I would not do like that for anything; but it was a mere matter of business—they were ordered to be done in that particular way. May be he was slandering the English buyer, but he said it with an air of truth that staggered me, and I was half inclined to believe what he said.

Mr. FARWELL: It is a conceded point that illegal or dishonest packing is perpetrated every day. The only question is, How are we going to stop it? In regard to the fraud suggested by Mr. McNeill that might be perpetrated in England—and I am sorry to say there are scalawags there the same as in Canada—there might be some plan adopted the same as in handling coal oil from the United States. When we get a barrel of American coal oil here it is inspected, and we have to erase or spoil the inspection brand before the barrel leaves your premises, under penalty, and a very severe penalty. Surely the men whose business is to get up Acts, who are experts at it, could conceive some way to cover all these little loopholes, and it seems to me they ought. (Hear, hear).

Mr. CARPENTER: I think we are getting an inspection too far away from home, I think we want an inspection before they leave here. I do not think we want it on the other side at all; for this reason: All apples do not carry in the same condition It depends on where they are placed in the steamer, and how they are carried, and how many days they are going over, and so on. I think the inspection should be here so that we would know we were not getting defrauded.

Mr. CASTON: Is there not a system in the Old Country by which the retailer has twenty-four hours in which to return the stock back to the brokers?

The SECRETARY: There is such a regulation.

Mr. CASTON: I think Mr. Farewell struck one important point in regard to buying orchards in the lump. The dealer is anxious to handle all he can, and he

buys more than he can handle, and sometimes he cannot get hands enough. Some Bay of Quinte men were up in the Georgian Bay district, because they all made money last winter. They could not get enough men, and owing to the unseasonable weather after the drought the apples began to fall, and I believe fully half of the apples are windfalls, and they are stored away now for packing. How those apples will come out it will be for the future to reveal, but I think it will be a sad tale of woe this winter. In the old way of buying apples by the barrel I think there were far better apples put up. I do not see why the farmer should not sell the surplus apples to an evaporator as well as the dealers.

Mr. GRAHAM: In the Georgian Bay district the apples are nearly all bought by the packing houses. They mark on the barrel "store" on the winter apples. I saw them on a long table. They empty them out and re-pack them, and they have a paper with their name cut out, stamped on it, the full size of the end of the barrel; they put that inside the lid when they are selling, so if there is fraudulent packing done it must be in the houses.

Mr. PATTISON: Could we not get at a basis to frame some sort of Act to check this by appointing a committee of fruit growers to confer with a Parliamentary committee, so that between the two they could draw up something satisfactory. It is admitted on all hands that there is fraudulent packing, and that it is vital to the fruit trade of the country that this should be stopped.

Mr. PETTIT: I think we all admit there is a very great and growing evil in the country, this bad packing of fruit. This resolution (of June 17th) was passed by a meeting of fruit growers this last season, and I will move that this resolution be endorsed by this meeting.

Mr. MURRAY PETTIT: I beg to second this resolution. I helped to draft it, and I think that although a step in the right direction it is not half thorough enough.

Mr. MCNEILL: I quite agree with the spirit of the resolution, but one thing will have to be changed. It seems to me impossible to indicate the sizes in inches when we are talking of different varieties. What would be a splendid specimen of this apple (showing sample) at that size would not pass at all in that variety (showing another sample).

Mr. POWELL: In our country the American Apple Shipper's Association have substantially taken the same action that you are considering to-day; and to cover the point raised last they classify the apples that will cover the 2½ inches diameter, which shall be of the grade of Fameuse, McIntosh Red, and that class which are recognized as only medium apples in size, while with the larger apples they are classified as the Greenings and the Baldwins and the Kings, and the larger grade is recognized by the variety. That is very easily reached in that way. (Hear, hear).

Mr. FARWELL: I do not think that you can grade the Baldwin along with the King. Some years the Baldwins are small size, yet they are perfect, clear from scab and worms, but still a little under size. Other years they will be a little large. You will get a 3 inch King almost anywhere, while a 3 inch Baldwin is a very large one. I think it would be better to allow the dealers to put in their apples according to their own inclination, and grade them themselves, and put their name on them, and put it on the outside. I cannot conceive what good the name of a dealer is on the inside of a barrel. No one but the person that uses them see it. But it wants to be on the outside, and the grade of the apple, whatever he calls it, on the outside also. Again, you take the Golden Russet, and you will find many a barrel of fine apples that are very small, that will run down to 2¼ or 2½ inches, and then you will find some other orchards that will run up to 3 inches. The inferior ones are good apples, though not worth as much as the large ones, if they are good apples, if I mark them what they are, and the dealer over there buys them according to my guarantee. I would make the shipper

guarantee everything just as he markets it. There is no difficulty in getting at it, though ; the only difficulty is to get the contents of the barrel guaranteed the same as marked.

The SECRETARY : I do not think this question of grades is nearly as difficult as it seems it might be. In Grimsby we have been exporting in fancy packages to Britain the past season, and using the identical grades mentioned in this resolution, and the apples less than $2\frac{1}{4}$ inch diameter have been marked "small" or the word "dessert" might be used, and then apples larger than A1 have been called Extra A1. That covers an apple like the large Kings. So by using such definitions the whole matter is disposed of. I think that will adjust itself very easily, and it is a great help in making sales I made a special sale of fifty barrels of Spys this summer to a buyer in Liverpool, just by defining the lowest size that would be in the barrel. They were to be above $2\frac{1}{2}$ inches in diameter, and this was the most satisfactory thing I could say to him in making the bargain ; and I believe it is going to facilitate the direct sale of apples to consumers or to individual buyers, or retailers in the old country, more than anything we can possibly do, because we can define the sizes that we intend to put in our different shipments, and that is one of the very things they are anxious to know.

The resolution was then put and carried unanimously.

THE PRODUCTION OF HIGH-GRADE FRUIT.

By G. E. POWELL, GHENT, N. Y.

It gives me very great pleasure to meet with you, and I have enjoyed exceedingly the discussion which has been so active, which has just closed. In the short time which I may engage your attention I should like to speak of the importance of producing more high-grade fruit. One of the solution of this very problem which you have been discussing is to eliminate as far as possible inferior grades. My first suggestion would be that no fruit grower attempt more orcharding than he can handle well. (Hear, hear). I think if there is a mistake, perhaps on the part of all of us, it is that all of us, it is that we are too anxious to extend our acreage, when the aim should be to produce more and finer quality. Now, this calls at once for the discussion as to how we can reach more high-grade fruit in our cultivation of orchards. We should start at the foundation of this question. I believe we should recognize the fact that we must deal with the soil itself as one of the first requisites of successful fruit culture. We are all of us now attempting to carry on a line of business which requires a high degree of knowledge and skill. Our soil has all been devoted for many years first to the production of cereals. After the growing of cereals for many years we have taken from the soil the cream of its plant food, that which is so essential to the production of the finest fruits. We recognize the fact that when we come to virgin soil, there we grow fruits in great perfection ; that upon virgin soil we have less of difficulties to contend with, simply because that soil contains the fullest abundance of plant food to give the most perfect condition of growth of tree and also development of fruit. Another point which occurs to me is this ; that in the very rapid destruction of our orchards we have changed somewhat the best conditions for general fruit culture. I know it is true in my own State that since our forest preserves have been so denuded, that during the past quarter of century we have been visited with great extremes. It is the rule for us to have extremes of temperature, very low ruling temperature suddenly, frequently coming upon us during the winter, and extremely high temperature ruling at certain times during the summer with very frequent and prolonged droughts. The result

is that our fruit trees to-day are subject to very severe changes, and the vitality of trees become impaired, and when that is the case it is with great difficulty that we can produce such a high-grade fruit as we should like to. Now, for the short time that is given us this afternoon I want to speak of the importance of the right.

Propagation of Fruit Trees.

I believe we have got to study the question of constitutional vigor in trees, and for a number of years I have been working upon this line, testing the value of selection of trees according to constitutional vigor. With us in New York State the King—which I might say, perhaps, is the king of all varieties, representing such very fine high flavor, representing such beautiful color, and representing (for at least a large portion of the trade) such desirable size — the King stands out prominently as one of our highest-prized fruits, and yet over a very large section of New York State it is by no means a safe apple to plant. It will not last to exceed fifteen years. At the very time when the tree should be coming to its greatest usefulness it begins to decline and fail, and at the end of twenty years King orchards have virtually passed out of existance. We recognize the fact that the King is constitutionally defective, and hence it cannot be recommended for general cultivation. At the present time I am extensively planting the King, but not upon its own body or upon its own root, but rather employing the principle which was somewhat discussed this morning, of top-working. I shall be very glad to give you as briefly as possible some outline of this method. I believe the principle of top-working is one of which we have not fully appreciated the value. I believe through the principle of top-working it is possible for us to largely reduce the time in which orchards may be brought into bearing. I believe that even with the Spy, by suitable top-working, we can reduce the bearing age of a Spy orchard a number of years. (Hear hear.) In the pruning of different trees, I discovered the fact that in pruning Rhode Island Greening, or in pruning the King or the Baldwin, that it was comparatively easy work. Half a day, or an entire full day, could be put in pruning without any very fatiguing labor, but when the Spy rows of trees were reached I invariably found in my own personal experience in pruning that I was pretty well tired out even before noon hour—that it was a vastly different thing pruning Northern Spy trees than pruning Rhode Island Greenings or Kings — for the reason that the wood of the Spy is so much more solid; it is so much harder in its texture that it is vastly more laborious to do pruning in the Spys than in many other varieties. This led me to the examination, then, of the woods of different varieties of apples, and the further study of the value of this stock to top-work other varieties upon; and about eight years ago I started in with the propagation of the King apple upon the Northern Spy stock.

I chose the Northern Spy from the discovery of its being an exceedingly hard textured wood, and hence also being a vigorous, thrifty tree in its growth—a most desirable stock on which to top-work other varieties. Now, in studying upon this question I want to emphasize the remark that was made here this morning in the belief in the individuality of trees. It is undoubtedly true that trees have their individuality, and hence in this principle of propagation we must study the traits and the characteristics of trees' growth, and we must study the individuality of trees, and not select promiscuously even from the bearing trees from which we are to propagate. There is individual force in the fact that the propagation of trees in the nursery from immature trees has the tendency to prolong the growth of trees certainly in the orchard. I think it is not materially different in the propagation of trees from the breeding of animals. All who are in the line of stock breeding understand that there is no wisdom in breeding from the young or immature animal; that the best results are obtained from breeding

along more mature lines of stock. This truth I think will hold equally well in the propagation of trees. If we are multiplying continually year after year from the young, immature stock in the nursery we are inducing in the propagation the continued growth of wood, as that is the function of the young tree of the nursery, first to develop and produce its wood ; and if we propagate from that source we are simply pushing that development of the wood growth to a longer period than we would if we selected our propagating stock from the more mature tree. Now upon this point let me say that in the selection of this propagating stock it is important to take a number of things into account. First we should study the tree as I have said from the standard of its individuality. We will understand as we go into a block of trees that there are those that require little pruning. They seem to be from nature well-balanced trees. They seem to grow in all directions naturally and well ; and we will strike many trees like this in our work which require comparatively little pruning. They seem to grow out as well balanced in all directions, and their growth seems to be such that they naturally grow into a fine and perfect tree, eliminating very much of the labor of pruning ; while on the other hand we still see trees that are inclined to fill up with massive growth of wood, and it is necessary to go in and prune severely in order to throw that tree out into the shape we would like to see it acquire. Now, in the selecting of propagating stock I would make a very careful study of this principle. And so in starting this orchard of Kings upon the Spy, it was my privilege to send to Tompkins County in New York State where the King grows to the greatest perfection. It is recognized that in Tompkins County, surrounded by lakes, the King does its best, and so pains were taken to send to this county to take the propagating stock from this section, and then from only what I describe as typical trees. I stated to the gentleman who got me the scions. " Now, study the tree in every respect closely and carefully. Study the tree in its form, and only select scions from the trees that are growing naturally in a perfect form." Secondly, the request was to study the character of the fruit. We all know that there are differences in trees in relation to the character of the fruit which those trees will produce. Some will produce uniformly good fruit, while again the tree next to it will produce a larger proportion of inferior fruit. There is where the individuality of the tree manifests itself again. I cannot explain it, but there undoutedly is a difference in trees in assimilating the nutrition which is obtained from the food and the soil ; and perhaps the greater power of assimilation of nutrition may make the difference between a tree that will produce a larger proportion of excellent fruit, as against one that will perhaps produce a larger proportion of its fruit inferior in quality. So the quality of the fruit and the character of the fruit was studied along with the natural form of the tree, and in this manner these scions were selected. The were placed in trees that were set out eight years ago two years of age, and at the second year the progagation began. Now as to the results. It has been a very interesting study all along to note the development of those trees. All along on this first system of propagation there were distinct differences in the forms of those trees. Some came into form beautifully. You could select here and there, all through this plot, trees that from the time the scions were set until the present time have been developing naturally very fine trees. In addition to that the same characteristic seems to have followed in the perfection of the fruit. The fruit is uniform in size. When you have picked Kings from these trees you will find that as they lie in a pile it is a very uniform lot of apples in regard to size. Evenness of sizes is marked in the production of some of those trees. Then again, the uniformly fine color which comes out upon them. So that the tree seems in this first experiment to be working out, proving that there is individuality in trees, and it is for us now as fruit growers to study and learn these, and then make use of them as far as we can. Now, then, to carry it further. In the planting of a

second block the selection would be made still from the finest of those that have first been started; and I find that out of a lot of 100 trees that the selections came from less than half a dozen—the perfect type is found within half a dozen. And so by the selection from those fine types the chances are in another block to increase this per cent. or larger number of typically fine trees; and I certainly have faith in this principle of propagating trees. (Hear, hear). I believe if we study it sufficiently and understand it sufficiently that it is possible for us to eliminate in our culture a large proportion of the inferior fruit which is now produced upon our orchards. I am quite well convinced in my own mind that we do shorten the period of bearing—the number of years. At the end of eight years it is now possible to take from these trees well toward two barrels of fruit During this past year, in propagating on this same tree from later winter sweets, at the end of six years there were trees that bore a full barrel of apples. At the end of three years propagating with the Sutton Beauty—another apple which is receiving a good deal of attention in New York State—at the end of three years I was able to take from these top-worked trees this year two bushels of apples from the tree; showing that the tendency of early development by the selection of buds from mature trees must have some force in it. We know that top-working will shorten the period in any event; but if we choose buds from trees that show in the first instance a strong tendency to early bearing I think we can bring down the period of bearing a number of years, and that is an essential point in this propagation, in addition to the other points that I have raised—to note the tendency for early productiveness, early bearing, and where we note that tendency to select our buds from those trees. I want to show you some wood taken from these trees, which I have brought with me. I hold in my hand some wood taken from the trees at the end of three years that produced two bushels of apples, showing a very fine development of fruit buds upon this wood at the same time that this fruit was borne during this past season. Now, in addition to the producing of two bushels of apples from this tree, although we have had a very prolonged drouth this past season—I think the worst drouth I have ever experienced in my business, no rainfall to wet the ground for six months to any depth whatever—you will see that there is a fair growth of wood upon these trees right through the severe drouth. The fruit was developed in the very highest perfection, and at the same time there is a very remarkable development of fruit buds for the coming year. So that it gives me strong faith in the principle of the judicious selection of stock to propagate our trees from. While upon this subject, tillage comes in, of course, as a very important part of this whole question. I believe we should push the question of development as rapidly as it is possible of all our trees. By the vigorous development of trees I think we put them in a position to resist diseases, to more effectually resist the insect attacks. If a tree from any cause is standing still that tree is certain to be afflicted with all sorts of troubles, diseases and insects; and hence if we can bring to our orchard management a high degree of culture, putting our trees in the most thrifty growing condition, we shall solve in this manner to quite a large extent some of the difficult problems of the infliction of diseases upon our trees. So I am a believer in very high culture; and here is an evidence of the rapid development that may be brought to trees in the bearing tendency. I hold in my hand peach wood from trees that have not been set yet two years—set a year ago this last spring—that are to-day fully developed with a strong set of fruit buds, and I can only attribute it to the special culture which has been given these trees during the two summers that they have been growing. You who are peach growers will recognize that there is a very full set of buds upon trees that have been standing in the ground but a little over one year and a half. Now, these trees were struck the year that they were set, in 1897, by peach curl to an extent that the foliage was

nearly sacrificed for a short time, but they rallied quickly from it. We commenced our spraying just as soon as we discovered that the trouble was coming, although that was too late to be the most effective; but we sprayed at once on the first indication of the appearance of this peach curl, and the result was we brought out a very fine foliage very soon indeed, and the check really was not so severe as it promised even that first year. The growth has been kept up continuously since, and the result this year is an exceedingly fine development of fruit buds, as you will see upon that wood, as the result of overcoming a bad start and catching up of the loss that was made from the visitation of peach curl during that first year. To show fruit in two years is a remarkably quick development of the peach, and it only shows the possibilities that lie within our means of bringing orchards into early bearing. I want to speak now in connection with this principle of propagation, and the mode of giving attention to our soil. Along with the top-working, and along with judicious pruning, we must see that our trees have the most perfect nutrition. I was interested in the dicussion this morning touching the development of fruit buds. It is a difficult question to explain. The scientific man finds difficulty in explaining just the whole process of the development of fruit buds, but it seems to me, from the closest observation which I can bring into my own business, not as a scientific man but as a cultivator, a fruit grower, that it is largely a question of nutrition. If your trees are properly supplied with plant food that is easily and readily available, it seems to me that is where the question lies largely. If there is the most perfect nutrition of the tree it will go on and develop those fruit buds either earlier or later in the season, but they will be developed strongly and thoroughly in proportion as is the most perfect nutrition of the tree. Now then, if we recognize that fact, then comes the important question, how can we bring to our trees the most perfect nutrition? I believe we have never yet fully understood the real philosophy of tillage. I believe the principle object of tillage is to get at the nutrition in the soil for our trees. I understand tillage to put the soil in the finest possible condition for our trees to utilize the plant food that is there most abundantly in all our soil. So in connection with this subject of the early development of bearing orchards, I followed a system of tillage which I will give to you as briefly as possible, and it may perhaps explain this very wonderful development of the peach buds upon this wood. As I said a few moments since, we are trying to grow fruit upon soil that has grown wheat and corn and hay and potatoes for many years. We have lost all of the older cultivated soil. We have lost one of its very essential elements to a large degree, and that is the humus of the soil. When the soil has lost largely of its humus it then feels drouth severely. It is thus that trees cannot receive the best nutrition, because it is through the principle of humus that the best action in the soil is carried on—the liberation of plant food, the retention of moisture, of water, to be carried through periods of long-continued drouths; and so for the past number of years I have been working along this line of re-incorporating in the soil a liberal amount of humus, and in my own particular case have been working with the crimson clover, now for eight years—first cultivating from the very earliest opening of the spring, bringing to that soil the most frequent culture that time would admit of giving, because in the earlier part of the season we must get the best development we can in the growth of our trees. Our fruit is made in the early part of the season; that is, it is given its best condition by the early tillage which we bring to the soil. We put our soil into the best possible condition through the very earliest tillage that we can bring to it, and then the most frequent tillage from that time up until the wood has been well grown, which will be in New York state somewhere about the middle of July. The frequent and constant tillage makes it possible for the plant food that is in the soil to be most readily liberated, so that the plants, the trees, the vegetation, whatever we are cultivating, can get that

food in the most available condition. When we have cultivated in this manner, when we have reduced that soil to its finest condition which I have indicated, which is so congenial to the roots of trees and plants, we naturally then must protect that soil from the loss which will follow in the after months. And so high tillage—the very thorough tillage which I am advocating now for orchard culture—will be destructive to that orchard unless we provide for the loss which certainly will follow unless we cover that soil during the next months when growth ceases for some plants. And so I believe in the winter covering of every acre of land that is brought under this system of high tillage; because you can see that when we have gone over a piece of land continuously week after week by this finest possible culture, we have exposed that soil for the balance of the season to rains and storms that will be most destructive of the plant food which we have so abundantly liberated through the process of tillage. So you should always follow this system of tillage by covering that soil with some growing, living plant for the following autumn or winter. I have been very successful indeed with the use of crimson clover; and I say crimson clover for this reason. It being an annual plant, it furnishes an opportunity, in the climatic conditions which surround me, to push this system of tillage for the finest development of our trees and our fruits earlier in the season; and then they have a plant that from its nature, being an annual that will grow rapidly, is especially adapted to sow upon the soil after the tillage ceases, and it covers that soil with a heavy, thick matted cover which protects it from the down-pouring and beating rains, and holds the nitrates which have been liberated by this high tillage. and so protects that soil from the serious loss which would ensue if it were left in a naked condition. Now the question which will arise in your minds is, can the crimson clover be grown by you as it can be grown by me? That is a matter for you to determine by experiment. Undoubtedly you have experimented with it here; but there are other plants that can be used. Among the pea family there are plants which can be used where perhaps crimson clover would not make a cover that you would like, and so you are not confined simply to the clover plant, but you can choose from others that will grow and make a cover for the winter. There is little to be said about peas; they are of course stricken down by the first hard frost, and you do not get quite so valuable a cover with peas as you do with ordinary clover.

Mr. Caston: Do you mean the ordinary peas, or cow peas?

Mr. Powell: The cow peas. But, with the thin roots that come from the pea plant, it helps to hold the soil together better, and I would rather have the peas if I could not grow the clover. If the soil is not covered with snow—and I apprehend that you have much more cover of snow here than we have in New York State, particularly in central and southern New York, where it is seldom that we have our land covered of late years with snow—I would rather incorporate with the peas, if the clover does not meet with your wants here, a little sowing of rye or wheat or grain. Any plant that will go through and keep its life during the winter will help to hold your soil in finer condition if you cannot carry the clover through the winter. So I would say, as a suggestion, to accompany your peas with a sprinkling of the rye, that you may have living roots, a living plant upon your soil all through the time of the winter months; and in that case you can get all the benefits which I have been speaking of here in the culture of the clover. Now, the clover culture, or any culture in this direction of the leguminous plants, it is surprising how they will restore the soil in plant food. I have met with some very great surprises in the use of crimson clover, and I am very glad to give you some positive figures in the matter.

Crimson Clover as a Green Manure.

Analysis of Soils.

	Three crops clover.	No clover.
Water	15.00 per cent.	8.75 per cent.
Nitrogen	.21 "	.12 "
Humus	2.94 "	1.91 "
Phosphoric acid available	.015 "	.008 "

Difference in favor of soil covered with clover.

Water	6.25 per cent.	equals	46.875 tons
Nitrogen	09 "	"	1,350 pounds
Phosphoric acid	.007 "	"	105 "

The soil was alike. There were only a few rods separating the places from which these samples were taken, and hence all conditions were similar. The chemist found in the clover treated plot 15 per cent. of water, after he had gone through the processes of drying that soil out as much as possible, as against 8.75 where no clover had been incorporated whatever. Now, these samples were taken at the end of a six weeks' very severe drought; we had no rainfall for six weeks. The ground was absolutely dry, or it seemed so, and yet there was the difference that was found at the end of that period of six continuous weeks of drought—47 tons of water more per acre on the clover-treated soil than on the other. That has explained one thing in my own culture, that I have been enabled to carry through large crops of fruit with apparently no loss for the want of water. The tillage, in the first place, as I have explained to you, has helped to conserve the moisture with it in the sub-soil. That was a help all through the early part of this dry period. That constant tillage just held down and kept down the water supply that naturally passes up by evaporation and so lost. That was held down and passed through the roots of the trees, and the result was that large crops of pears and apples have been carried through these droughty seasons without any apparent loss or damage except a little diminution in the size of the fruit. So that the difference in the water contents is very marked indeed, you see, between these two samples of soil. I want to speak of the humus next, because it is so closely connected with this water question. The chemist found in the humus portion of his work 2.94 per cent., as against 1.91 in the other soil. There is the explanation of this whole question of the water supply in the soil. You see, the largely added amount of humus made it possible for that acre of land to carry out and to hold and to distribute for a longer period that amount of water. It was by filling up the soil with all these millions of conducting roots which this plant gives to it, thereby re-incorporating the lost humus material, that it was enabled to hold and distribute and carry out that larger amount of water to the acre; so that the humus is very closely connected with this question of the water supply in the soil, on the very principle that you will readily understand, that a sponge will take up, and take up, and take up water continually, and then it is a long time before it gives it all off. On the same principle the humus acts on the soil as sponges can in retaining water. Now, the next important figures in this experiment relate to the nitrogen. While these trees have been carrying large crops of fruit the trees have also been making a liberal growth of wood. These two things do not go together always. You will find that the heavier the growth of your fruits upon your trees, the less growth there will be of wood, and especially if a large crop is produced in a droughty season, you get scarcely any growth whatever of new wood. Many of you will recall that there would not be an inch of growth upon a pear tree grown in a dry season that was producing a large crop of fruit—absolutely no new wood made; yet in this pear orchard, where this growth has been going on, they have grown crops and at the same time made from 1½ to 2 feet of wood. So the soil has been well supplied with nitrogen, which is a very essential element in producing wood upon our

trees. Now, what proportion of nitrogen has been brought to the soil? A chemist was with me from Cornell University, and in listening to the discussion of the growth of wood and the production of wood through droughty seasons at our farmers' institutes he said to me once "Do you know what you have been doing with this clover business?" I said "No, only in a general way there has been vigor and growth of tree, and there has been productiveness of fruit, but I can say only in a general way, not being a chemist." Then he proposed to analyze all these soils himself, as a chemist only can determine accurately just the operations that are carried on by the growers and fertilizers, and so on, in the soil; and when he reached the nitrogen results they were astonishing. He found .21 in the clover-treated soil, as against .12 in the non-clover soil, and the difference of .9 per cent. of nitrogen in an acre of soil 13 inches deep is 1,350 pounds. Now, to have purchased that nitrogen and put it on an acre of soil during three years, at the low valuation of 15 cents a pound, would have cost me $202.50; and yet that amount of nitrogen was added to the soil, with possibly a little liberated by the process of tillage, but largely this amount was added by the clover plant itself, showing how economically and how rapidly we can build up the lost plant food in our soil by the incorporation of a plant like the clover plant. And the peas, of course, will do the same as the crimson clover has done. That, it seems to me, is one of the most inspiriting lessons I have ever learned in my orchard management—that it is possible for us to go on and continue to grow fruits, and at the same time improve our soil. Now, that is a very important statement to be able to make. The general processes of production are destructive. Here is a practice which we can pursue of high tillage, and when we have finished our high tillage we can incorporate in our soil a plant that shall at the end of the year, the same year that it has produced its crops, leave that soil even better than it was before. That is a very great statement to be able to make, and a truth very important for us to realize. So that we have not yet learned the value, in our orchard culture, of incorporating a clover crop at the latter part of the season, after all cultivation and all production has passed by. Now, one other point in regard to this chart, and that is the phosphoric acid. The chemist found .015 per cent. in the clover-treated soil, as against .008 in the other. The difference in the three years made 105 pounds more available phosphoric acid which he found in the soil. I asked him to explain how it was. By the incorporation of the larger amount of humus, the larger amount of humic acid which is produced in the soil set free more largely the phosphoric acid that was available for the use of the plant. He has not worked out yet the potash results, but he indicated to me that they would be undoubtedly as striking as the phosphoric acid, showing that before we expend the money to any large extent for an artificial fertilizer it will be wisdom for us to utilize that which is in the soil to-day abundantly. Your soil is not impoverished here. You have a magnificent soil, particularly here in Ontario, and I have no question of doubt will be productive for hundreds of generations yet to come. (Hear, hear.) It is only a question, while all these processes of production are being carried on, of re-incorporating through these plants that have the special power to build up in the soil its most important elements, humus and nitrogen, and you have production here for unlimited ages to come; and generation after generation can go on, and your soil will be better a hundred years from to-day than it is now. That is the possibility. I think when we can so handle our land that each generation shall find it better than the preceding one, that we have reached certainly a very valuable line of work and discovery in the culture of our land. (Applause.)

Mr. A. H. PETTIT: You make no account of spring growth of the clover plant. You plowed it from time to time in the spring?

Mr. POWELL: Yes. With me, I prefer to get that growth in the autumn. A great many say, "Suppose it winter kills, isn't there a loss?" No; you have

made your gain in all the growth that you got from July or the first of August up to the winter. The plant has done its work; the nitrogen is in the soil; the humus is there, and if it winter kills, although I would rather have the living plant, it is not materially a loss. Now, suppose the plant goes through and comes out in the spring alive. I prefer not to have any spring growth, for this reason: We have all experienced this past year a very serious drouth. It is what is the matter with all our apple business to-day; the longer period of dry weather, followed by an exceedingly warm autumn, has brought the apple business into a condition of national calamity; that is just what it is to-day. In the spring we want to avert all the loss of moisture that we can. If our clover begins to grow in our orchards during the spring, the plants are just pumping up the water that is now being stored during these winter rains and storms; and so I prefer to put the plow in and plow it down, even if it is alive, on the very first day that it can be done in the spring. Stop the growth; stop the pumping up of this water through the growth of the plant, and put it under through tillage at the earliest possible moment; and then, after we have got the growth of our trees re-incorporated, plant again the latter part of the season.

Mr. TWEEDLE: Do you find the take of clover the second and third year easier than the first?

Mr. POWELL: Decidedly. When I first sowed, although I had great faith, I sowed something like ten acres as an experiment. The next year the growth was very much better. The third year it was decidedly better, and now I have no failure at all with it, even during this past season of drouth. I have 70 acres covered to-day with the clover that has just simply gone on and made a good covering against all this very dry season which we have had—not as strong as usual, but good.

Mr. PATTISON: Would there not be a great difficulty on many soils, especially in a dry time, in getting the clover to start at all at that date? It seems to me the main difficulty of that system is that there are many soils in our neighborhood where it would be impossible to get clover to take then, except in a very exceptional season.

Mr. POWELL: I would answer that in this way: If you keep your soil under the thorough tillage which I have already outlined, you have retained sufficient moisture in your sub-soil, unless the drouth is extremely prolonged and severe, so that you will really get a very fair start of that plan even in a dry time. Of course, if you could get just one shower to start off the plant, it would strike its roots down into that moist soil, and then you would be certain of a good stand. The danger would be along in July—if you would sow as early as that—of a dry condition of soil that would fail to germinate your seed.

A MEMBER: What do you do immediately after the sowing?

Mr. POWELL: When you finish your last cultivation sow the seed, then run it over with the cultivator and cover the seed very little. That keeps it down, and if there is any moisture, the roots will strike right down.

Mr. MCNEILL: There is another reason for plowing that early, before there is any spring growth. About corn-planting time I had an enormous growth of crop just coming out in bloom. That was plowed down, and it formed a perfect mat and broke up the communication between the sub water and the top of the soil, although I had the top soil in excellent culture; the corn that was sown remained there for weeks, just as if it was in the crib, until the rains came. Had that fine soil been in communication with the sub-soil water by a comparatively firm soil, the corn would have grown immediately—there would have been sufficient water thrown up from the sub-soil, in which there was plenty of water, to have germinated the corn.

Mr. TWEEDLE, of Winona: What soil is yours, Mr. Powell?

Mr. POWELL: It is what would be called a gravel loam; it is not a sandy

loam—just between a sandy loam and a shale. It is not a shale, but it is a gravel loam inclined to a sandstone sub-soil.

Mr. TWEEDLE: How would that compare with a clay soil?

Mr. POWELL: The clay soil would be the heavier, and I think the crimson clover is not so congenial to the clay soils as to our heavier loams; and if you have clay it is a question whether the peas would not be better than clover.

Mr. CASTON: How do the cow peas compare with the clover as a nitrogen crop?

Mr. POWELL: They are very good. I like the crimson clover because of the large amount of humus it puts back in the soil. Your peas do not give you quite as large an amount, but as a nitrogen gatherer it is equally as good.

Mr. PATTISON: How would some heavy straw-growing varieties of the ordinary field peas do? They attract a great deal of nitrogen.

Mr. POWELL: I should think where you could grow them they would very suitable indeed for your heavier soils.

A MEMBER: Would you recommend such tillage for all kinds of fruit trees?

Mr. POWELL: Yes, I think I would make no exception whatever, even to the peach, which is more susceptible to tillage than almost any other tree. I would recommend the same tillage for the peach although in a peach orchard I would withhold somewhat the clover; although I want to say right here that I have had the crimson clover for six continuous years in the peach orchard, and that peach orchard to-day is in the very finest condition of health of any trees that I know. In the peach districts of Delaware and Maryland they would not dare to sow crimson clover as I am sowing it in New York state, but I am experimenting with this orchard to see how far the crimson clover culture can be carried, and although last year the buds were frozen mostly, still the growth of wood was excellent and no trees were frozen where for six years the crimson clover had been plowed in around those peach trees.

Prof. MACOUN: I would like to describe our system of tillage at the Experimental Farm. It is a little peculiar on account of the character of the soil. I think we are getting very good results from that system. The soil is a very light sandy loam, in fact it might almost be called barren in parts, and my purpose is to try and get as much humus as I can in as short a time as possible, because I think it is very important to have it there, and we are adopting a little different system from what is generally advocated. Supposing you have a cover crop of clover in the winter—and I may say we use common red clover with great success—we plow that under in the spring and re-seed immediately with clover. That clover is allowed to grow through the season, and it is cut at intervals. It is cut all the next season—that is, it is cut for two summers. The second season I have had in four weeks of that clover 25 tons of green clover lying in the orchard from four cuttings. The clover reached a height of 18 to 20 inches before each cutting. I cut it just before it came into bloom, and the result is that we have a moist and decayed vegetable matter lying on the surface of the soil; we have a gradually-accumulating mass of humus just below the surface of the soil, and I have found the orchard not to suffer in the least degree from the lack of moisture. I would not advocate this system on any other kind of soil than we have there. Although the soil is very sandy it seems to contain a quantity of moisture, and I think that we are really warming the soil by this clover treatment. Of course the second winter the clover dies, but we plow it under in the spring and re-seed it.

The CHAIRMAN: You do not take the clover off the soil; you just cut it and leave it on the ground?

Prof. MACOUN: Just cut it and leave it on the ground.

J. D. SERVOS: Suppose the soil of an orchard is in excellent state of cultivation, would you recommend sowing the orchard to Hungarian grass and at the same time seeding it with lucerne and afterwards cutting the Hungarian and pasturing it with pigs for a number of years?

Mr. POWELL: I should hesitate to put in a crop like Hungarian grass in an orchard that is thriving, growing and producing good crops of fruit. I think there would be danger, although the very fact that your orchard is thrifty is the evidence that it is now in excellent condition. I would not interfere with that by putting in any crop like Hungarian grass. I think that you might find the danger of checking the thrifty, excellent condition, especially if you should be followed by severe, dry weather with that crop of Hungarian grass; I think you would give your orchard perhaps a very serious check, and I would not like to risk a thing like that.

MR. SERVOS: What do you say about lucerne, and pasturing the orchard with pigs afterwards?

Mr. POWELL: That would be making the same draft on your soil that the Hungarian would.

Mr. SERVOS: The reason for using the Hungarian grass is to make a proper catch for the lucerne. I found this year that in sowing in that way I did have a full catch of the lucerne, while heretofore it seems to have been not a success. I have just come to this county this year, and I tried that for the first time in my experience, but I have made a good catch with lucerne, and the pigs are enjoying it just at the present time. It is growing now, even in this climate.

Mr. MCNEILL: I am afraid you will find the pigs will ruin your lucerne; they will take the crown right out of it.

Mr. SERVOS: Did you treat the pears with the same treatment of clover culture?

Mr. POWELL: Yes, the pears were grown under that same system. Apples, peaches, plums, cherries, in fact everything that is cultivated is put under this system. Potatoes and corn, and even the garden is all kept under this system of clover treatment.

Mr. PATTISON: Do you not find that there is any tendency to produce blight in certain varieties of pears, cultivating at all?

Mr. POWELL: No, they have been entirely free from that.

Mr. SERVOS: After getting your land in that state of cultivation would you advocate growing a root crop?

Mr. POWELL: In a young orchard first planted, if you will feed each crop that is taken off, it is admissible to put in small fruits such as strawberries or raspberries or currants, which is my practice, growing those small fruits in all those newly-planted orchards, but each crop is fed independently while it is growing The same can be done with corn and potatoes, provided that each crop you put in you feed independently of the trees. That keeps up your culture, and you get some production from the soil; but it would be ruinous to attempt to crop a young orchard unless you fed each crop that is taken off it.

Mr. PETTIT: In reference to the crimson clover, you said down farther south it would not be wise with peaches—in Delaware. Why?

Mr. POWELL: For the reason that they think there is too much incorporation of nitrogen in the soil; that it makes too much growth of wood and danger of winter-killing their trees and their fruit-buds. That is the reason they do not dare to sow continually in Maryland and Delaware. Too much nitrogen induces too succulent a growth of wood, it being a warmer climate. I presume they get a larger elimination of nitrogen than we get in this colder climate. I presume they do not like nitrogen so much as they do phosphoric acid and potash in those states of Maryland and Delaware.

Mr. HUGGARD: Have you found any effectual remedy against pear blight,

and has manure and cultivation a tendency to increase pear blight or otherwise ?

Mr. POWELL : I have never suffered from pear blight from cultivation or high manuring. I want to state to you frankly this afternoon that my pear orchard stands to-day absolutely ruined, but it is from an insect, not from high culture or high feeding. The last good crop of pears I had was ten years ago, which was 1,200 barrels. Prior to that crop the soil was heavily top-dressed with stable manure fed from steer feeding, the ration composed of wheat, bran, cornmeal and linseed meal, the manure drawn directly from the stable to this pear orchard and spread heavily upon the surface. In addition to that, a half ton of fertilizer per acre was used in the spring. That is applied early and plowed in lightly and the ground harrowed. That season this crop of fruit was produced which would barrel over 90 per cent. of No. 1 fruit. The trees were in the most thrifty condition. There was not the first evidence of any blight anywhere in the orchard. The following season there came the blight over the orchard, and it was very generally charged that I had over-manured and over-cultivated that orchard. But it was not pear blight. It was the first visitation of the pear Psylla, and I hope if you have not got it you will never get it in this beautiful country. It is the most disastrous thing that ever struck my business.

The CHAIRMAN : We have it.

Mr. POWELL : I am very sorry to hear it. Out of 2,000 trees I have lost 700 to-day, in spite of all I could do to keep down the ravages ; 700 beautiful trees to-day are dead and gone, and will have to be cleared from the soil. Now, that has been a visitation of this insect, but there has been no evidence of blight whatever owing to this high culture. No evidence of blight has made its appearance in my orchards ; so that I have proved in my own experience that with my soil, with my conditions, with high tillage and high manuring, it has not produced pear blight for a moment. I am thoroughly convinced of that.

DELEGATE : What insect is that ?

Mr. POWELL : The pear Psylla is so minute that you cannot discover it with the naked eye at first. It works at the axils of your leaves and at the stems of the fruit, sucking out the sap, exuding from their bodies the substance known as honey-dew, which gradually settles down over the branches of your trees, after which a fungus attacks your trees, turns them black, stops the growth of the tree, stops the development of fruit, and ruins it. And it is the most persistent thing I have ever had to meet in my business, and I am at the point to-day of clearing my entire ground of pear orchards ; I have almost reached that point.

The CHAIRMAN : Has the kerosene emulsion not been sufficient ?

Mr. POWELL : It is very difficult to reach it. I have sprayed on the first appearance, persistently sprayed, and we cannot get it down. I have been advised by our entomologist not to give up, but I think ten years is a pretty long fight. I confess I am getting discouraged. This past ten or twelve days I have undertaken to give it winter treatment. I went out with my kerosene barrel into the orchard on pleasant sunny days when the Psylla are out. They are little flies now, and you will see them crawling up and down the bodies and branches of the trees. I undertook to control this pest by the advice of the entomologist of Cornell University, with winter treatment. We sprayed with five per cent. kerosene and it had no effect on them. Then we used ten per cent. kerosene and no effect followed. We used 15 per cent., and the Psylla would crawl right out unharmed. We added 20 per cent. and I think killed a few ; and when we put it 25 per cent. we killed all we hit. The next day we sprayed one entire orchard, and there just as many live ones on as there were the day before.

Mr. SERVOS : Returning to the crimson clover, are we to understand that treatment is annual ?

Mr. POWELL : Annual treatment. That is why I like the crimson for me, because being an annual it grows very rapidly after it germinates, so I get a

handsome cover for the soil during the winter months. The red clover being a biennial, we cannot get so good a crop of cover as we do with the crimson.

The CHAIRMAN: Does the crimson go right through winter?

Mr. POWELL? Yes.

Mr. TWEEDLE: Sown in July?

Mr. POWELL: Yes, sown about the middle of July.

Mr. BOULTER: What is your object in sowing so late?

Mr. POWELL: We want to keep up the cultivation of our orchard till as late as possible.

Mr. BOULTER: Do you sow anything but the clover?

Mr. POWELL: No, not with me. If it be necessary to have a nourish plant with it I would put oats or rye by all means.

Mr. MCNEILL: That would be too early for crops. If we quit cultivating any crops in July they haven't the quality.

Mr. POWELL: You would have to cultivate crops up till middle of August. This year I sowed even to the middle of September, and have a very good crop to-day.

Mr. MCNEILL: It is a splendid crop to put in after strawberries.

Mr. POWELL: Yes, very fine.

Mr. GEO. E. FISHER: In regard to the pear tree Psylla, in response to an invitation last year I visited the large orchards of Mr. Latch's, at Youngstown, in New York State. He took me to a very large block of dwarf Duchess pears that he said he had expected to lose from an attack of the pear tree Psylla. The trees were dropping with honey-dew. The foliage was sticky all over, and the fruit was covered with the honey-dew. The trees themselves had become blackened with the fungus which always develops where this honey-dew is abundant, and he had given up this orchard expecting to lose it. He said it was a very profitable orchard, and he felt it was a great loss not to be able to retain it. However, he said he had heard of the advantages of lime, and in February, 1897, he gave his orchard a thorough spraying with lime. He had no formula. He used all the lime that his nozzle would draw. He put all the lime on the trees that he could make stick. He applied it only once, and he cleaned his orchard entirely. When I saw this orchard in May it was bristling with fruit buds. The trees were the very picture of health. There was nothing about the trees at that time—of course there was no foliage—to indicate weakness or disease in any form. Now I would like to ask what time you plow this crimson clover down? How much a growth you obtain at the time it is plowed in, and when you sow? And then do you expect to gather nitrogen by it?

Mr. POWELL: In 1898 I had a growth of fourteen inches of crimson clover on the 1st of December, sown the 20th July among corn bushes; and in this pear orchard and in apple orchards the clover measured a height of fourteen inches. That which was sown later, in August, made a growth of from six to eight inches. Now, this is plowed in in the spring just as soon as the soil gets dry enough to go upon it and work it; and I will say here that you can plow your land that is covered with crimson clover at least one week earlier than you can naked land. It puts the season ahead for working at least one whole week, and I look upon that as a very important thing, because we must count and base our calculations more and more upon seasons of drouth. I do not know why, but it is becoming the rule of late years to run into severe drouthy periods, and I think as fruit growers we need to recognize that fact and prepare for it, and plan for it. Just as quickly as we can stir our orchard soil in the spring, by so much are we going to avert the damages from drouth, because we hold back the subsoil and water just as quick as we can stir that ground and can begin to work over its surface. One week will lose for us hundreds of tons of water in the spring by not stirring the ground. Evaporation begins and goes on so rapidly that it is of the utmost

importance that we get into our orchards early in the spring and plow and conserve its moisture. So I plow one week earlier by having this cover on the ground than I could without it. In regard to rye that will only add humus. It will add no nitrogen whatever to any soil. It has no power whatever to do that.

Mr. McNeill: Except indirectly; it will certainly make the nitrogen which would be in the soil more available.

Mr. Powell: It will from the fact of its making humus in the soil, but in itself it is not fitted to add nitrogen.

Mr. Servos: How deeply do you plow your clover?

Mr. Powell: Only about six inches.

Mr. Pettit: One difficulty may arise with our soils here in regard to that treatment. Our heavier lands, with a mass of clover and deep fall of snow, might suffer severely from mice on the unthrifty growing trees.

Mr. McNeill: Yes, there would be certain seasons where they would suffer from mice. For three or four years we have a regular migration of mice.

Mr. Whitney: I do not understand plowing six inches deep during the tillage. Suppose I make up my mind to try your plan in a pear orchard that has been left in grass, it will not do for me to plow six inches deep.

Mr. Powell: No. If you are going to take up an orchard that has been in grass for years you ought only to cut and tear that sward to pieces, because your roots are clean to the surface. They have to get their most available plant food near the surface. Now simply cut and break your sward, then put on your tooth harrows and tear it all to pieces; but it would not be at all safe to put your plow right over and plow to that depth. The more you cultivate the orchard the more you send the roots down.

Mr. Caston: Prof. Craig, formerly of Ottawa, now of Iowa, exhibited a chart at this Association giving results of clover at Ottawa. He showed that crimson clover was a better nitrogen trap than any crop he had tried, including the ordinary red clover and the Lucerne. He showed the crimson clover had a greater proportion of nitrogen, but unfortunately for a large tract of this Province, it will not live over winter; it dies quite early in the winter, even under the most favorable conditions. I would like to ask about these cow peas. I see by the bulletins that we get from the other side that they are highly thought of. How much do you sow to the acre, and about what do they cost?

Mr. Powell: I tried my first experiment with cow peas this year. I wanted to know the comparative value of cow peas with crimson clover, because I met in so many places the question that you raise here—that the crimson clover is not adapted to your locality so well. I sowed the cow peas at the rate of one bushel to the acre broadcast, and harrowed them in. They cost me, I think, $1.90 a bushel. They made a very fine growth, although the season was a very dry one. They grew to the height of about 20 inches this year. The first frost cut them down, and they make a fairly good covering, although not equal to the crimson clover as covering for the winter.

A Member: I would like the speaker to tell us why our Flemish Beauty pears blight and scab so much here, while most of our pears in Ontario go on well. Not one year in ten can we get any Flemish Beauty.

Mr. Powell: The Flemish Beauty is particularly subject to the attack of the pear scab fungus. There is a difference in varieties. The Baldwin apple and the Fameuse are the same—more subject to the apple scab fungus than some other varieties. So it lies in the variety itself. It is not able to resist the attacks, and hence it goes down under that attack.

Mr. Servos: There is no remedy that you know of?

Mr. Powell: The only remedy I know of is Bordeaux Mixture, and in many sections it does control it very largely. In some sections it does not. But Bordeaux mixture applied very thoroughly and persistently early in the season,

before the buds open at all, and followed up, will in many instances very thoroughly control that scab upon the Flemish Beauty pear. I have seen beautiful specimens grown by four or five sprayings of Bordeaux mixture upon the Flemish Beauty tree. The Baldwin is quite subject to scab. The foliage of the Baldwin is very defective with us in New York State.

Mr. SERVOS: The Baldwin grows better with us than it does with you.

Mr. POWELL: Yes, it does.

Mr. PETTIT: Have you any trouble with the Bitter Rot on the fruit itself?

Mr. POWELL: The Bitter Rot is extending quite seriously in New York State. It is a fungus trouble that takes the fruit early in the season. The fungus spore strikes the fruit and it develops just under the skin, and you have what is known as the Bitter Rot, which ruins the fruit for market or for use; and I think it is owing to the general decline of the Baldwin apple, and I think that general decline comes from the fact that its foliage is weak, that it is not a strong resisting foliage, and I think the Baldwin apple is failing because its foliage is tenderer and not highly resistant to fungus attack. For that reason I am planting to-day the Sutton Beauty apple, which is similar to the Baldwin in appearance, but the foliage of which is like that of an oak tree; it stands right up against the apple scab fungus, and I think we can grow Sutton Beauty in as prolific quantity as we used to grow the Baldwin apple.

Mr. MCNEILL: Mr. Morris could probably give us some very good information as to how the Sutton Beauty suits our local conditions here.

Mr. MORRIS: I would say that it does well with us, and while we have grown the trees a good many years I have been surprised there has not been a larger demand for it. I look upon it as every way a first-class apple. The quality is better than the Baldwin; in fact, the quality is first class. I would like to speak on the apple that I brought here as a long keeper. I have noticed in this apple a tendency to stick on the tree late in the fall. This year I let it remain on the tree to see how long it would remain. About a week ago I had them gathered. At that time about half the crop was on the tree and the other half on the ground, but all sound, while everything else in the sample orchard, all kinds, perhaps nearly three or four hundred varieties that fruited, had rotted or disappeared one way or the other—even the American Pippin, that will keep with us from January to June. This is an apple that was sent to us by the late Charles Dalby, and it is called the Horn.

G. Y. SMITH: Is it not too small for shipping?

Mr. MORRIS: It will keep until next spring.

Mr. SERVOS: Is that a fair sample as to the size?

Mr. MORRIS: It will grow larger. The trees require pretty strong soil. We have no trees for sale, and we would not grow them for a dollar a tree.

DELEGATE: They are too small.

Mr. MORRIS: I intend to graft a number of trees with them any way.

Mr. FARWELL: You want to get a force pump inside and force them out. (Laughter.)

Mr. MCNEILL: They are large enough for a dessert apple.

Mr. MORRIS: I am afraid we are missing the most important points in the address we have had—that is, the individuality of trees and the importance of top-grafting. I believe every word the speaker has said as to the top-grafting of trees, and particularly the King on the Northern Spy. There are good reasons to be given why that is a good tree to top-graft on with the King. He did not mention it, although he is well posted on it. First of all, the wood is entirely different. The Northern Spy wood is hard and fine grained; the King wood is coarse grain, and does not make the union as complete; I mean it does not unite so but what there will always be a certain amount of check to the flow of sap there. That is really what makes it bear. Then there is another thing: the roots of th

Northern Spy grow downwards, while the King roots are few and they spread out and run near the surface. There is a great deal of value in getting the roots thoroughly established downwards first. The great point about top-grafting is this : where that graft is put in on the top it checks the flow of sap, and will throw that tree into productiveness.

Mr. McNeill : Put a wire tight around it.

Mr. Morris : I was going to speak about that. That is where you can get your individuality—by doing anything that will check the flow of sap. If it is unproductive you can wind a little wire around it. The next year it will bind the bark on that. The next year you will have a good crop of fruit.

Mr. Smith : Kill the tree.

Mr. Morris : No, it will not ; that wire will cut into the bark and it will grow right over it.

Mr. Boulter : Where would you put that wire ?

Mr. Morris : Anywhere. It is well known that grape growers to go through the process of ringing their vines for show fruit. Most of you know something about that. In the Toronto Exhibition there is fruit that has been ringed. The The fruit is larger, and will ripen perhaps eight or ten days earlier, but has not got the flavor. The process of ringing is just taking and ringing the bark right out of the branch of the grapes. Now, this individuality may come in this way ; there may be some defect about the stem of the tree. Even a little bark at the bottom that you would not notice will check the flow of sap and throw that tree into productiveness. I cannot come to think that, taking a lot of trees together, one will have sense enough to be productive and grow a particular shape, and others not, unless there is some cause for it. I believe that plants and trees do almost have sense. Anybody that is amongst them all the time and studies them can notice their pecularities, and cannot help coming to the conclusion that they do know something. (Laughter.) You take a climbing vine that will start, and it will feel around for something to climb on, and perhaps it will get hold of something and climb up quite a distance ; but that thing, whatever it is, may not be congenial to it, and it will unwind itself from that again and feel for something else and go up that. Or you may take a tree of any kind, and if there is a pile of fertilizer some distance from it the roots will go in the direction of the fertilizer. Take a willow and plant it on a dry piece of ground. Of course we all know willows like moisture. If there is a water pond or well or cistern or anything that way, the root will start for that moisture, and it will get there. Now, when we know and understand all this, we cannot help but think that plants do know something ; but still I do not think plants will know so much as to assume certain shapes unless there is some cause for it.

Mr. McNeill: I think my friend, Mr. Morris, agrees strictly with the lecturer on that, after all, because you will be perfectly willing to admit that those fine horses that you feed so nicely there would breed a better class of horses next time, because they were fed so well this time, and therefore you would rather breed from them than from the scrubs your neighbor has.

Mr. Morris : Certainly I agree with him in what he says about feeding and cultivation.

THE PROFITS OF AN APPLE ORCHARD PROPERLY SPRAYED.

By E. B. Edwards, Q.C., Peterboro.

I am not a farmer and I am not a fruit grower in the same sense that many of you are here. I am not an exporter of fruit in the sense that many of you are here, and I don't pretend to know half of what a great many of you know. I can only give a little bit of my own experience in spraying in the hope that it may be of some use, and in the hope that it will not go any further if it is not. Some eight or ten years ago the late Mr. Dempsey visited Peterboro, in connection with one of the farmers' institute meetings, and I got my first light on spraying. The course that the Government have taken in enlightening the people in this Province upon the facts of spraying in a practical way have been of the greatest use, and they have solved the problem of helping the people in their development to an extent that they perhaps do not receive full credit for—(Hear, hear). I think they should receive full credit for it, and their efforts should be backed up by those here who know the benefit of spraying, in order that those who do not know it so well get the benefit of it and that it may spread through our country. (Hear, hear). I think we may deduce as a general proposition this result: that an orchard properly sprayed will have its value increased at least fifty per cent. over another orchard that is not sprayed. That is an average in all seasons and all through, probably in many cases—I found it so in my own case—the average will be much greater. The value has been doubled, I am satisfied, in many cases in the small orchard I have had charge of; and I believe that one is quite safe in putting it that the average increase in value would be at least fifty per cent. If you apply that to what is going on in this country, the development that is taken place in the productiveness as far as our orchards are concerned is something that is not perhaps tabulated to the full extent that our other crops are tabulated. The value of the orchard to Ontario is something that we have not yet, I think, quite figured up, and the value that is possible to be obtained in Ontario from the extension of the growth of orchards and the best production from the orchards in this country is something that we cannot measure. We are only at the beginning of it, and it is for the people and the Government of the country to see that everything is done to help the upward tendency in that direction, and to see that when people are setting out and going into orchard growing they are doing it on right lines. This Association is doing its work splendidly, and the help that is being given by the Government, through the desire that the Government seems to have in helping on this good work, I think is much to be commended. A few years ago I had the first information given to me by the late Mr. Dempsey on spraying. It came to me as a sort of revelation. I had taken hold of an orchard that my father had planted years ago, and that had been a very good one in its way, of some five acres, and I found when I took hold of it that the apples were small, especially in the Fameuse, and very scabby, and in very many other varieties, nearly all of them, they were worn-eaten. It was almost impossible to get a perfect apple out, and in attempting to ship away a few barrels I found it required three or four barrels to be turned out on the table to get one barrel that was decent at all. That seem to me very unsatisfactory, and it was after this I got the information from Mr. Dempsey and began spraying. I found the increase in the quantity of good apples to be so great that it surprised me beyond my expectations; and I found after a little that I could venture on the shipment of apples to the Old Country, and was very agreeably surprised that, instead of having to turn out three or four barrels for one barrel, I could get out for about half. I thought that was very well. I went on spraying, and I found I got a large percentage; and I think in my own experience it has doubled the productiveness of the

orchard in good fruit. Take for instance a year ago. In 1898, when other orchards in the neighorhood had not good crops, I found I had a first-rate crop of apples. On a single variety of some 22 trees I had some 66 barrels, which turned out about 50 barrels of first-class apples and netted me in Peterboro about $3 a barrel. I thought that was very good, when the culls out of them netted from $2.25 to $2.50. It was rather an exceptional year and rather an exceptional circumstance, to get a good crop where other people had a poor crop, and get them clean and good. But whether the crop is large or small the result is the same in proportion —that you get so much larger a proportion of good fruit that it is an easy thing to see that you attain the result of increasing your crop at least 50 per cent.; and if you apply that to all the orchards of the country the gain on the average through the country is something that is almost impossible to figure up. I look upon it, therefore, that although I cannot give you much experience here, nor say much about it, I have responded to the call made upon me to say from my point of view—coming from the back country district where there is not much fruit grown, and where experience of others, as well as myself, has been limited—that I am fully convinced that the spraying is the greatest thing that can be done by orchard growers of the country to increase the quantity and the productiveness and the value of their orchards.

The CHAIRMAN : One item was passed over this morning, the introduction of representatives of other horticultural societies.

Mr. W. C. REID, President Belleville Horticultural Society, said : I would just say that in Belleville our society is in very good condition, and everything is going along favorably. I came here for information rather than to give any and we are in harmony with the Fruit Growers' Association. We have a membership of between 60 and 70, and have decided to continue as a branch of the Fruit Growers' Association of Ontario.

REPORT OF THE COMMITTEE ON NEW AND SEEDLING FRUITS.

BY PROF. H. L. HUTT, O.A.C., GUELPH.

It is usually in seasons when the fruit crop is abundant that the greatest number of new fruits is brought to light. During the past season the fruit crop has not as a rule been a heavy one, nor have many new fruits been brought to the notice of your committee. In fact fewer samples of seedling fruits have been received this year than for several years past. Among these few, however, there are one or two especially worthy of mention, which will in time, no doubt, take a place on the list of standard varieties.

In the table below we give a brief notice of what has been sent in. Those deserving of special mention are marked with a star, and are described more fully in the paragraph descriptions which follow.

SENDER.	REMARKS.
Seedling Apples.	
J. D. Marsh, Mille Roches, Ont.	Something like a highly colored Greening med. size ; fair quality, but not superior to Rhode Island Greening.
Jas. W. Grady, Annan, Ont.	An apple very similar to, if not identical with, Yellow Bellflower.
*J. P. Williams, Bloomfield, Ont	A handsome winter apple, said to be a seedling of the Belmont ; promising.
J. P. Cockburn, Gravenhurst, Ont.	"Minto" ; a hardy Muskoka seedling ; med. size ; green and dull red ; fair quality ; but hardly worthy of propagation.
Wm. Mowbray, Sarnia, Ont.	Med. size, yellow splashed with light and dark red; quality fair ; but flesh too coarse grained to make it valuable.

Sender.	Remarks.
Seedling Pears.	
R. L. Huggard, Whitby, Ont.	Large; obtuse pyriform; yellow with red cheek; flesh tender and juicy, with some granules; quality good; season Nov.
*Miss Lillian A. Trotter, Owen Sound, Ont.	Seedling raised by the late Mr. Trotter. Below med. size; yellow with pink tinge on sunny side; flesh buttery, and of good quality; promising.
Seedling Plums.	
*E. D. Smith, Winona, Ont.	The "Emerald"; handsome; greenish yellow; like a small Washington; quality excellent; very early, ripening about Aug. 1st.
*F. R. Latchford, Ottawa, Ont	Like Englebert; med. size; blue; fair quality; said to be very hardy and productive.
Seedling Peaches.	
*E. D. Smith, Winona, Ont.	The "Millionaire" peach; large and handsome; resembling Early Crawford; yellow flesh; freestone; excellent quality; season of Late Crawford.
R. T. Smith, Hamilton, Ont.	Samples of this peach were also received and reported on last year. Fruit large; white fleshed; red cheek; good quality; season Aug. 15th to 25th.
Seedling Grape.	
*John Charlton & Sons, Rochester, N.Y.	The "Charlton"; a cross between Mills and Brighton; bunch and berry large; color light red turning to moroon; quality excellent: promising.

Seedling Apple. Received in May from J. P. Williams, of Bloomfield, Prince Edward Co., Ont. Said to be a seedling of the Belmont, or Waxen apple. Mr. Williams says the tree is hardy and very prolific; begins bearing at an early age. The fruit is of good size and handsome appearance, having a bright red cheek which should help it to sell in an old country market.

Seedling Pear. From Miss Lillian Trotter, Owen Sound, Ont., grown from seed by the late Richard Trotter. Tree said to be healthy and a rapid grower. Fruited for the first time in 1898; a fair crop this year. Fruit below medium size, obovate, obtuse pyriform; skin yellow, with bright pink tinge on the sunny side; numerous small brown dots; stock medium length, stout; cavity rather broad, very shallow; basin narrow, shallow; calyx open; flesh yellowish, moderately juicy, buttery, sweet, high flavor. Quality very good. Promising.

The "Emerald" Plum. Received from E. D. Smith, Winona, Ont., Aug. 1st. The accompanying engraving, and the following description of this promising plum appeared in the September number of the *Horticulturist.*

"So long ago as the year 1889, the late Warren Holton, of Hamilton, well known in fruit-growing circles, sent us a sample of a new seedling plum, which he called "Early Green." In an accompanying note he said, 'considering its size, fair quality, and in particular its early season (1st August) in ripening, I think it may prove worthy of cultivation.' About August 1st, 1899, ten years later, we received another sample of this plum under the name of Emerald, which we had little difficulty in identifying as the same. The accompanying engraving shows the plum in natural size; the color is greenish yellow, form roundish, of good size and excellent quality; coming in before the better varieties of Japan plums, and not being subject to rot, this plum will no doubt be of considerable value."

Seedling Plum.—From Hon. F. R. Latchford, Ottawa, Ont. The accompanying engraving of this plum appeared in the July number of *The Horticulturist,* where Mr. Latchford speaks of it as follows:

"A blue plum in my garden here is remarkable for its hardiness and productiveness. It most closely resembles the variety "Prince Englebert." The tree is said to have been planted about 25 years ago, and to be the only one of a number purchased at the same time which has lived. The trunk divides in three

parts almost at the ground, where it has a diameter of about 15 inches. It is absolutely hardy, and yields enormously about every second year. In 1898 I

THE EMERALD PLUM (natural size).

gathered from it 440 pounds of fruit. At least 60 pounds more fell owing to the wind, or with branches which could not be propped. The size of the fruit is

medium to large, and the quality good. The variety seems a desirable one to propagate, especially in the East; and I shall be glad to give scions for budding, at the proper time, to all who may desire them. Our engraving shows a terminal cluster of the fruit."

The "Millionaire" Peach.—From E. D. Smith, Winona, Ont. Mr. Woolverton gives the following account of this peach in the October number of *The Horticulturist*:—

"We are in receipt of a very beautiful sample of peach to-day from Mr. E. D. Smith (Sept. 12th), which well deserves notice, providing the tree is hardy and productive and the fruit should average anything like this specimen. It very much re-

A Seedling Plum.

ssembles a fine sample of Early Crawford, but the form is rounder, the cavity and suture deeper, and cheek a darker red. The flesh is a beautiful yellow, of tender texture, juicy and highly flavored, quite equal to that of the Early Crawford, while the pit is smaller. Coming in at the season of the late Crawford, it has no competitor that we know of unless it be the Wonderful, which is also of about the same season. It precedes Elberta, apparently, by about a week."

The Charlton Grape.—From John Charlton & Sons, Rochester, N.Y. Mr. Woolverton has also noted this promising new grape in the October number of the *Horticulturist* as follows:

"We have received to-day (September 27th) three bunches of the new

Charlton grape. Messrs. John Charlton & Sons, of Rochester, the introducers, say, 'We send you a sample of our new grape which we allow to speak for itself'; and certainly if the vine is healthy and productive the qualities of the fruit are such as to ensure it a place among our very best varieties. A cross between Mills (Muscat Hamburg x Creveling) and Brighton, (Concord x Diana) two varieties themselves possessing most excellent qualities, we would expect nothing less than a first-class hybrid. The bunch is large, about five and a half inches in length, shouldered and very compact. The berry is large, skin tough, light red turning dark maroon and almost black at maturity; covered with a thin lilac bloom; flesh meaty, tender, pulp breaks up readily from seeds; flavor sweet, fairly juicy, sprightly, aromatic, very pleasant."

WELCOME BY MAYOR RUTLEDGE.

The Mayor cordially welcomed the Association, and said: I know of no Society in this country the aims and objects of which are of such universal application to all classes of the community. They seems to affect everybody. There is scarcely anybody in this country that has not a little ground to cultivate. Some have an acre, some ten, some a hundred, but the objects of your Association affect every man who has a bushel of apples or any quantity of first-class fruit to sell; and I feel that your Association is doing a most wonderful work for the people of this country in instructing them in the mode of turning the result of their labor into cash. A man is going to plant trees, and your Association will tell him what kind to plant, and what soil to plant them in; how to treat them after they are planted; the enemies that are liable to attack them from the moment they are planted as long as they are alive; the enemies that are going to attack the fruit from its inception to maturity, and how these enemies can be destroyed or their effects neutralized; so that those who attempt to grow fruit may be enabled to grow first-class fruit. Then your Association deals with the question, what to do with this fruit when it is grown; how it is possible to take fruit and place it on the European market in about the same plight and condition as when it left the hands of the producer. When you have accomplished that, I submit that you have opened a mine of wealth in this country to every man who wishes to avail himself of the opportunities. The question of sending fruit to the English market in a sound and satisfactory condition will be solved on scientific and practical principles, and in a very short time. When these questions are pressing on the people they will be solved by scientific and practical men; and I am very glad to see that your Association produces a very large number of such men. I have been comparing your magazine, the *Canadian Horticulturist*, as it appears to day with the production of ten or twelve years ago, and have been struck with the remarkable progress you have made in this publication, which to-day is beautifully printed and illustrated, and the mechanism and everything about it is first-class. It is a credit to your Association and to the country, and reflects the highest credit upon the editor. (Applause). There is scarcely one subject that any fruit-grower is in difficulty with, or wants to get information on, but if he is a careful reader of that journal he will find the very information he wants, written by practical and scientific men. I submit it is a publication of the highest importance to everybody, and the cost of it is next to nothing. One article in it on any subject on which a man wishes information is worth more than the price of the magazine for the year, and I trust that every fruit-grower in this section will be a subscriber to the *Canadian Horticulturist*. I will not detain you any longer. I again thank you, and trust that in the near future you will again be in a position to honor us with another meeting of your association. Applause).

The CHAIRMAN: On behalf of the Ontario Fruit Growers' Association I tender you our sincere thanks for the kind words you have spoken, Mr. Mayor, and the hearty welcome you have given us to your town. It is evident from the large number here this evening that you take an active interest in this work. The men who laid the foundation of our Association over thiry years ago laid it wisely and well. Although it was securely laid, it has proved to be a very moveable institution. To this fact, and the earnest efforts of your Mr. Huggard, we have to give the account for the pleasure of being with you this evening. Many of the members of our Association are largely engaged in fruit growing. Their constant effort is to secure the best varieties of fruit and to grow it to the greatest degree of perfection possible. We have made fair progress in this direction, but our customers say that some of us have not succeeded so well in in packing. Now, we are here to receive all the information that your local growers will give us, and we will be pleased to give any information that we can in regard to fruit or fruit growing, and do anything we can to advance the interests of horticulture and floriculture.

REPORT OF THE EXECUTIVE COMMITTEE.

The past year has been one of considerable progress on the part of our Association. The membership has increased about 400, and the number of affiliated societies now on our list is 42. The members of these societies are mostly amateur flower growers, as well as fruit growers, and ask that some attention to floriculture be given in the journal. With this in view, an addition of eight pages has been made to the *Canadian Horticulturist*, and much information given on this subject. These societies contribute materially to our strength, and give us a large field of usefulness. One of the strongest of these societies is the one at Hamilton, which is increasing in numbers every year.

The following lecturers were sent out to these societies in the spring of 1899:

Prof. Macoun, of Ottawa, to Brockville, Cardinal, Iroquois, Smith's Falls, Carleton Place, Arnprior and Kemptville.

Dr. Jas. Fletcher, of Ottawa, to Napanee, Brampton, Oakville, Hamilton and St. Catharines.

Alex. McNeill, of Walkerville, to Woodstock, Paris, Waterloo, Seaforth, Kincardine, Durham, Owen Sound, Orangeville, Meaford, Thornbury, Orillia, Midland and Burlington.

M. Burrell, of St. Catharines, to Lindsay, Campbellford, Stirling, Picton, Trenton, Cobourg, Port Hope, Millbrook, Niagara Falls, Port Colborne, Hagersville, Port Dover, Simcoe, Leamington, Windsor, Chatham and Grimsby.

These societies have reported their appreciation of the addresses given.

By-laws were prepared for the uniform guidance of these societies by Messrs. Thos. Beall and L. Woolverton, and copies sent to each society. These by-laws have been included in the report for 1898.

Your Executive have endeavored to use the power you have entrusted them with in the wisest possible manner.

The committees on transportation and freight rates were called together frequently, and the resolutions adopted were duly forwarded to the Minister of Agriculture at Ottawa, and resulted in securing for us the requests therein made, which are printed in their report.

Much public scandal against fruit shippers being caused by the 6,500 barrels of fraudulently packed fruit on board the SS. "Castilian," wrecked off Yarmouth,

N.S., your Executive prepared the following resolution, addressed to the Minister of Agriculture :

"Whereas, it is well known that fraudulent packing of apples is a very prevalent evil which is yearly bringing discredit upon the name of our Dominion, and ruining the English markets for our Canadian apples ;

Whereas, as a matter of fact, Canadian apples are the finest in the world, and will bring the very highest prices in the British markets, if confidence in the packing can be sustained ;

Whereas, we believe that about eighty-five per cent. of the apples grown in Ontario that are shipped to Great Britain are purchased, graded, packed and shipped by dealers, and, as it is to their interest as well as the interest of all concerned that a reliable brand should be established :

Therefore, resolved, that we do humbly pray that you will provide some remedy for the same.

We would suggest that certain marks or numbers be adopted to indicate certain grades and sizes of apples, and that it be made a misdemeanor for anyone to stamp these marks or numbers upon the outside of his packages unless the contents of the packages are in accordance therewith ; that the name and address of the owner and shipper be always required on either the inside or outside of closed packages intended for export ; and that an inspector be appointed, with power to open packages, and, if found fraudulent, to expose the offender.

And we further suggest that the terms used for grading be 'No. 1' and 'A No. 1,' 'No 1' to include sound apples reasonably free from worm holes, scabs or other blemishes, and to be not less than 2¼ inches in diameter, and grade 'A No. 1' the same, with apples not less than 2½ inches in diameter."

This resolution was adopted by large numbers of our Horticultural Societies, but objected to by the Burlington Horticultural Society, on the ground that all varieties could not be graded alike for sizes.

This matter is being considered by the Department, and we have no doubt that some scheme of grading and inspection of fruit packages will be prepared that will remedy the evil.

In view of the great importance of the grape industry, and the low prices prevailing in Canada, we prepared the following resolution to the Minister of Agriculture for the Dominion, and sent it also to various affiliated societies for approval :

"Whereas, the grape is one of the most important food products in Canada, and very large acreages are devoted to its production ;

Whereas, of late years the yield has been so abundant that our home markets are glutted, and the prices so low as to leave little profit to the grower ;

Whereas, certain varieties of Canadian grapes have superior flavor and excellent carrying qualities, as for example, the Rogers' hybrids ;

Whereas, we are persuaded that British consumers need only to become acquainted with the excellence of such grapes to become fond of them :

Therefore, resolved, that we humbly pray that you will export in large quantities our Rogers' grapes to the best British markets, and that they be put up in neat and attractive packages and sent out in costermonger carts in such a city as Manchester, until the trade reaches a firm basis."

This resolution was approved by the societies most heartily and duly forwarded to the Minister of Agriculture at Ottawa, but the Department there was so discouraged by the failure of the previous attempts made with mixed varieties, of which Concord and Niagara were prominent, that they would not touch them in 1899. Having full confidence that our Rogers' grapes would win favor in the British markets, we referred the matter to the Minister of Agriculture for our own Province, asking that the Board of Control of the Ontario Fruit Experiment Stations be authorized to make a small shipment of Rogers' grapes to Manchester. Consent being obtained, our secretary was authorized to forward a few hundred small cases, containing about 20 lbs. each, to B. W. Potter & Co., Manchester, who have agreed to place them in the hands of retailers and costers in that market. The result will be awaited with much interest.

Much complaint being made in certain quarters against the drastic nature of the revised San José Scale Act, your Executive called meetings to get the expression of the growers regarding it, and, when the Commission was appointed, everything possible was done to facilitate their work. The opinion expressed by most fruit growers at these meetings was that the pest should be utterly stamped out since the infested area was limited to about twenty square miles.

The following is a copy of a resolution which was unanimously passed by a public meeting of fruit growers at Grimsby, on the 16th June, 1899, called by

your executive, and a copy was forwarded to the Hon. John Dryden, Minister of Agriculture:

"Whereas, the minute San Jose scale is the most serious enemy that has ever threatened the fruit grower;

Whereas, the Government has passed an Act which is calculated to save the fruit orchards of Ontario from being infested with this scale;

Wheras, certain persons, whose orchards were found to be affected and who were ordered to have them destroyed, in their own and public interest, have waited upon the Minister of Agriculture asking that the law be not enforced;

Therefore, resolved, that we consider the Act to be all important in the interests of the farmers and fruit growers of Ontario, because it is the only sure way of saving our orchards from ultimate destruction by this terrible pest, and that we consider the interests of the many of much greater importance than the interests of the few.

We, therefore, express our deep regret that the operation of the law has been suspended at this season of the year, when the scale is beginning to spread and when a fortnight's delay may cause irreparable damage, and we earnestly beseech you to enforce the law, allowing the findings of the Commission, lately appointed by you, to govern your action with regard to future years.

And we further pray that you consider the interests of those growers whose orchards have had to be destroyed by so increasing the amount of compensation that they will have no just reason for complaint.'

Your executive also wrote the Hon. Sydney Fisher asking that the resolution of our Association asking that Mr. W. M. Orr be appointed to the charge of Ontario fruits at the Paris Exposition be considered. The reply was that Mr. A. McD. Allan, of Goderich, had already been appointed to superintend the horticultural exhibits of Ontario (including the fruit). The executive then wrote that the interests of the Ontario fruit men were so important in the foreign markets that, in our opinion, it was most desirable that the Vice-President of our Association be also sent over to assist in the representation of our interests.

Mr. Allan visited the executive in August, asking the co-operation of our Association, of our Experiment Stations and of our Horticultural Societies in making up about 800 bottles of Ontario fruits in advance, and in supplying fresh fruits for cold storage for the Paris Exposition. In this work the Secretary has written about 150 letters and, in response, has secured liberal contributions of our choicest fruits. Those for bottles were forwarded to Prof. H. L. Hutt of the O.A.C., Guelph, and the apples and pears for cold storage to Auguste Dupuis, Secretary for the Paris Exposition, Ottawa.

Our plant distribution has given great satisfaction. The following is a list of the plants sent out:—

737 Yellow Rambler rose, 388 Pink Rambler rose, 412 White Rambler rose, 504 Ampelopsis Veitchii, 262 Eleagnus Longipes, 261 Ginko, 420 improved Lombard plum, 291 Hughes plum, 228 Saunders plum, 182 North Star currant, 320 Columbian raspberry, 26 Crimson Rambler rose, 1 Dempsey pear, 5 Wickson plum.

A few of these had been winter killed, but were replaced free of cost. In response to inquiries as to whether the $500 or $600 spent in premiums would be better spent in enlargement of journal, a great difference of opinion has been expressed, some strongly urging one way and some another.

Your Executive hopes that during 1900 we may be able to attain both these ends. The journal has been embellished with numerous half-tone engravings, a fine new cover, and, with the exception of one or two months, enlarged to forty-eight pages. During 1900 we propose to enlarge the page and widen the columns and thus give considerable more matter with the same number of pages. We also propose a still more attractive cover.

In the carrying out of all this work we have expended as little money as was in keeping with the best interests of our Association. We have paid $153.00 for assistance to the Secretary in bookkeeping during the portion of the year, and will need to make a regular allowance for this in 1900.

Owing to the new postal regulations, we found it necessary to have the journal mailed at Grimsby, instead of Toronto, as heretofore, which made it necessary to engage a mailing room near the Grimsby post office. The same regulations also require postage on the journal which has amounted during 1899 to $41.36.

The additional number of journals printed, 5,000 a month, instead of 3,000 as per contract, and the additional eight pages, making forty-eight and cover, instead of forty as per contract, has increased the expense of printing the journal to $170 a month, which has been further increased in certain months by the demand for samples and for advertising space.

CONSERVATORY POSSIBLE IN OUR HOMES AT SMALL COST.

By Dr. Harrison, Keene.

In our younger days we were satisfied with the flowers that were in the windows, and we took much pleasure and so much joy out of them. Why, you as well as I, sir, have been in many a home, and seen with what joy and pride the lady of the house looked at that spindly thing in the kitchen window. It was the dead of winter, but it had a few sickly green leaves on and it was a joy to her heart. But as we have advanced in our social surroundings and in our better equipment all the way round, the fact is that that esthetic sense—which is one of the senses that has not been taken cognizance of as it should have been—demands a better quality of flower, and a larger variety.

Look at this exhibit and think of the fruit we had when we were boys. I had the pleasure of going to a school, walking a mile and a half, and it was a joy to our hearts when December came that we could go over to a crab-apple tree with apples about that size (showing) that would draw your mouth up. Were any of you in Toronto during the last crysanthemum show at the Pavilion? Look at those massive things. You can have those in your homes. Look at those ten inches in diameter. Look at those orchids which stood up on that dais; you can have these things. Look at those carnations which were so charming, and those roses which Dunlop had there; we can have those too, and not at great expense. How? That is the first question. There are two ways within the reach of every person of average means. In the first place, in constructing our verandahs, construct them with the idea that they are in touch with our principal living room, whether that is your library or dining room, or whether it is a sort of half withdrawing room. A wide verandah, a verandah on which you can get a large amount of side light; then you can have a bench along the side of that, and you would be surprised — I have tried it for myself — what a quantity and what a richness and what a fullness of bloom is possible. Now, you know that in so many of our homes now, instead of the old wood stove or the old base burner coal stove, we have our furnaces in the cellar. You say, "Well, what are you going to do with hot air?" You can do something with hot air, but not so much as with hot water; and there is no furnace, whether for wood or coal, in which you cannot put a little coil and carry that into the small conservatory and give it a generous, even heat which will give you beautiful flowers. Try to grow a certain class of flowers or roses, say carnation violets, in any ordinary room, and you cannot do it satisfactorily. Your roses will be overcome and devastated with aphis, and your carnations will fail to open up in their beauty, and the violets will religiously refuse to bloom satisfactorily and give their fragrance. Why? Because the temperature in the ordinary room is up and down, up and down, and that is inimical to plant prosperity. They do not like it any better than we do, the see-saw of life, and they don't prosper on it any better than we do. It is irritating, and they resent it at once. Another form of conservatory, which is more desirable and cheap—remember I am not talking about one that is the most desirable and expensive, not one that with its span and with its arched glass roof is one of the luxuries which are only available to the rich—but I am speaking of

that which is available to those of smaller means, that is, to build on the side of the house a lean-to conservatory. I have one in my mind's eye now, 12 feet long, 8¾ feet wide, with 100 plants that are doing sterling duty the whole year round, and supplying the house with a profusion of bouquets. That is, a small house, but you can have it anywhere 10, 11, 14 feet wide, and whatever length you want; but by giving a top glass to it you have plants that will grow straight up. It is just the ideal thing for your carnations. They open up beautifully without that crack on the side which is so apt to be with side light where they turn their faces. Having the top light you bring your plants nearly to the glass so as not to meet so much of the refractive rays, causing your plants to be healthier and sturdier in growth, and the flowers themselves to be richer in tint and sweeter in odor. Carry out the same idea again in regard to heating. If you do not put in a heater by itself, carry from your house furnace a coil and you can run your hot water underneath your plant shelves, or you can run it above it, or run each pipe along the glass. The advantage claimed for the latter plan is that the air that comes chilled from the glass becomes heated before it falls on the flowers. Either take in a verandah and make a conservatory of it, or build a lean-to and make a conservatory of it. You can take the latter and make $100 build your concern, put in your heating apparatus if you have not already a furnace in your cellar, and stock it with a fair variety of plants which you could not grow in your living rooms to advantage. Last year I saw a little conservatory of that sort 9.6 ft. wide, 24 feet long, with 500 plants, with bouquets of roses and carnations, geraniums, fuschias, and a large number of the other plants, supplying not only the household but a church on Sabbath day with bouquets, and furnishing flowers for nearly all the sick families within the radius of some three or four miles; and I am positive that that did not cost $80 in its whole outfit. It was built and heated by itself, which is the better way, because then you can regulate it. One of the old "Giant" stoves was taken and in the top of it there were five coils of inch pipe, and then that pipe was carried with ten coils under the bench, six coils on the back wall, and the whole cost of that plumbing was as follows: the cost of the stove was $6; the mason was paid $3.50 for bricking it in—the mason found the bricks; and the plumbing cost $22; the owner being a handy man built the walls himself, bought the material at the sash factory and had a carpenter two days to get the thing closed; and with that small cost he had all that beauty for himself and others. Do not attempt to put everything you can read of in the books into your conservatory, nor to put all that you read of in books in practice. Go slow. Feel your way. We are always safe in starting with geraniums. The geranium is one of God's greatest blessings in the flower line to humanity, because it will stand almost any treatment and show a smiling face. There are some plants that are just as pernickety as pernickety can be, but you must understand their pernicketiness or you will not get the pleasure from them. You who love horses do not want a horse that goes like a tame sheep, but you want one that makes you feel the ribbons, that it is a thing of life, and that you control it. That horse steps out and you feel that you can pass John A. Thompson as you go down the street. Flowers need to be handled in the same way. It is said that roses would be as sweet under any other name. I do not know. I never saw roses under any other name; but you know they are sweet and desirable. The plant that would be more amenable next to the geranium probably is the carnation; but those of you who are lovers of flowers know that what we called carnations when we were boys would not pass as flowers to-day. Look at those carnations, great beauties, splashed, white and rose, yellow, mauve, almost all the shades of color, and so sweet and so fragrant, and they can be grown in a little conservatory like that, so that a couple of dozen roots will give you carnations galore. Then next to that, in a small conservatory, it is desirable to have that which is ornamental. Then you come to the palms. Keep to the Kentias;

they will give satisfaction. There are certain plants which have somewhat been neglected in the greater majority of sections, and that is the begonia family—beautiful plants that require a little attention and little study and which are most desirable and full of beauty. They would be almost sufficient for any amateur to start with and would give him satisfaction. Where there are apples and music there should be flowers. You know there are birds in so many homes, and what a dirty thing that sweet little canary is, and how often you have to take the dust pan to gather up those broken seeds; but you could have fish—a small aquarium fitted with some of those Mediterranean carp known as gold fish, or even some of our own minnows or shiners or red roach, or beautiful sun-fish. A few of those in an aquarium, with a certain amount of plant life so as to balance your animal life with your botanical life. Water should not require changing any oftener than two or three months, and feed them a little German feed once a day, and you have got a thing of beauty and a joy forever. Their sinuous and graceful movements are a charm, and you can sit and watch them with pleasure, and they are ever so much more cleanly to look after than Dicky is.

BEAUTIFYING COUNTRY HOUSES.

By Prof. H. L. Hutt, O. A. C., Guelph.

The sturdy pioneers who first settled this country came with a determination to subdue the forests and to hew out for themselves homes in the wilderness. To them the idea of levelling a lawn and planting shade trees or ornamental shrubs would have been ridiculous. But we have now reached a period in the country's history when comfortable homes are thickly dotted throughout the land, and more attention is being given to the beautifying of the home surroundings. Not only is the skill of the landscape gardener more and more in demand, but there is a call for information on the subject by those who have not the means to employ a professional gardener. In this brief paper we shall attempt merely to call attention to some of the leading principles which should guide in laying out and beautifying the surroundings of a country home, and what applies to the country home, will in many cases apply equally well in the ornamenting of a town lot.

The first idea to be grasped is that the most beautiful scenes are as a rule more or less natural. We must, therefore, accept nature as our teacher, and study the materials and combinations which go to make up natural beauties.

The materials with which the landscape gardener has to deal may be classified as natural and artificial. The natural materials are the ground, grass, trees, shrubs, vines, herbaceous plants and annuals, and in some cases rocks and bodies of water. The artificial materials are trees and shrubs clipped into unnatural shapes, geometrical beds of improved flowers, terraces, walks, drives, buildings, fountains, statuary, etc. The skill of the landscape gardener consists of the judicious use of these materials. Let us now consider some of these a little more fully.

The Ground. One of the most important features in the ground surrounding a home is the contour of its surface. This is what gives character to a place. A low lying lawn with something of a depression in the centre has a tame appearance, while a similar lawn with but a slight crowning in the centre has an altogether different look. Sometimes a perfectly straight surface line is pleasing, and the level lawn is more in keeping with the place and its surroundings than any other could be, but as a rule some variation from the straight line is preferable. In nature we take more delight in bold outlines of hills and valleys than we do in level

stretches of country. This is because we love the variety which hill and hollow afford, and this suggests the desirability of introducing undulations in landscape gardening whenever the size of the grounds and other circumstances will admit.

The buildings should, of course, be on the highest elevation. and the grounds should be made to slope away from them. On a steep hillside the grounds may have to be terraced. This, if well done, adds much to the appearance of a place, but likewise adds considerably to the cost. Whether the grounds are flat or rolling the irregularities of the surface should be levelled and smoothed so that the mower may be worked easily. Wherever much grading or filling has to be done due allowance must be made for settling, and a few inches of good surface soil should always be left on the top. The character of the surface soil is a matter of great importance, because on it depends the luxuriance or poverty of the grass and trees growing upon it.

The Green Sward. There are two ways of clothing the ground with grass, either by sodding it or by sowing grass seeds. On small plots or steep banks and along borders sodding is the quickest and most satisfactory method, but on large areas seeding is not only the cheapest but the best. In preparing the ground for seeding it should be plowed, harrowed, rolled and made as fine as possible, and as a final preparation nothing is better than going over it carefully with a garden rake.

The kind of seed to sow is a matter of importance. Coarse grasses, such as timothy, are not suitable for lawn making. Many of the finer and more delicate grasses may be obtained in "lawn grass mixtures," but the most satisfactory mixture we have found is made up of equal parts by weight of Kentucky blue-grass, red-top grass, and white Dutch clover. All of these are hardy and stand well the extremes of our climate. The seeding should be done on a still day, when there is no wind to carry the lighter seeds. Thick seeding should be the rule. Three or four bushels per acre is none too thick for seeding down a lawn. In fact the grass should come up as thick as the hair on a dog's back. After the seed is sown it should be lightly raked in, and if the weather is dry it is well to go over the ground with a hand roller. The work of making a lawn may be done at almost any time of the year, but where much levelling and filling is necessary it is well to do the grading in the fall, so that the ground will have finished settling by spring,and then the surface may be raked over as soon as it is dry enough to work, and the seeds sown as early as possible. A lawn sown early in the spring should be nice and green by the middle of summer, or seeds sown early in the fall should give a good grassy carpet for the next summer.

Keeping a Lawn. To keep a lawn in prime velvety condition it should be mowed frequently, particularly during the season of rapid growth. The mowings should be so frequent that none of the cut grass need be raked off. This is the practice followed on well kept city lawns where men, money and mowers are available. On the farm where these articles are sometimes not so plentiful, and where the area to be gone over is usually greater, it may be kept in very respectable condition with the ordinary farm mower, the cutter bar of which should be set low and the knives kept sharp. On the farm the front yard and back yard, the lanes and the roadsides should all be levelled, seeded and put into such condition that they can all be gone over with the farm mower, and if the mowing is done as often as the grass is high enough for the knives to catch it nicely the improvement made in the appearance of a place would in many cases add nearly 50 per cent. to the value of the property.

To maintain a luxuriant growth and a rich dark green in the color of the grass, the lawn should occasionally receive a top dressing of stable manure in the fall. The soluble portion of this is washed into the ground by the fall and spring rains, and early in the spring the coarsest portion of it should be raked off.

Trees and Shrubs. In the trees and shrubs we have some of the finest forms of natural beauty. They present a great variety of ornamental qualities, in habit of growth, in size, in color of bark and foliage and in their flowers.

Taking the trees first, they may naturally be divided into two classes, the deciduous and the evergreen trees. If time permitted we could give a lengthy list and mention the special claim of each to a place on the lawn, but we must be content with mentioning only a few of the most desirable. Among the maples we have the sugar maples, the soft maples and Weir's cut-leaved variety of the same, the Sycamore maple and the Manitoba maple, which is particularly valuable on new places on account of its rapid growth, but along with it should be planted some of the more durable trees, which will come in and last long after the Manitoba maple has served its purpose. As a successor to it we know of none better than our native American elm. In its finest form, with feathered trunk, high spreading arms and long, pendulous branches, this is, in our opinion, the most stately and graceful of our native trees. On large grounds, where there is room for variety, some of the rugged oaks and fragrant lindens add a charm to the scene. The cut-leaf weeping white birch is very ornamental in both summer and winter, and shows a striking color contrast, particularly when placed so as to have for a background a group of evergreens or a dark colored building.

Among the evergreens the pines and spruces occupy a first rank. The Austrian and Scotch pines make handsome specimens, although in its younger days our native white pine is equal to, if not superior to, any of the foreigners. The same might also be said of our native white spruces, as compared with its more vigorous relatives from Norway. But for a handsome specimen of nature's coloring let us have the dainty little blue spruce of Colorado. Among the arbor vitaes, junipers and retinosperas, we have some very beautiful forms, such as the pyramidal and globose arbor vitae, the tall Irish juniper and the plumose retinospera.

Ornamental Shrubs. For a list of some of the most desirable and hardy ornamental shrubs adapted to our northern section, I cannot do better than refer intending planters to the valuable list given in Mr. Macoun's report in the Central Experimental Farm Report for 1897. One hundred species and varieties are there mentioned, with twenty-five of the most desirable marked. If we were compelled to reduce the list to half of that number, we would from our own experience select the following: The Caragana or Siberian pea-tree, Hydrangea paniculata, the Tartarian bush honeysuckle, the mock orange or Philadelphus, the golden currant, Spirea Van Houtii, the golden elder, the old-fashioned lilacs in variety, the snowball or viburnum, and last but not least, roses in variety.

The Arrangement of Trees and Shrubs. To artistically arrange and distribute a collection of trees and shrubs on the lawn requires much more skill and judgment than to set out trees in a straight line in an orchard. The following are a few of the principles which should guide in lawn planting:

1. Follow as nearly as possible the natural order of arrangement. Nature does not plant trees in straight lines, but scatters them about in irregular profusion, in too much profusion, in fact, to be followed out fully in lawn planting. It is often necessary, therefore, to modify the natural arrangement to meet the needs of the case. One has said that "the aim should be to exhibit nature idealized rather than nature real." A prominent American landscape gardener tells us that for his first lesson in arranging trees on the lawn he was told to take in his hand as many stones as he had trees to plant; to stand by the house and throw them in the direction he wished the trees to stand, then plant wherever the stones fell.

And he says that with a few slight modifications the effect was all that could be desired.

2. Arrange to give an air of breadth and expanse to the place. This is a most desirable effect, and is secured by preserving a more or less open lawn in front of the house, by scattering and grouping the larger trees at the outside of the grounds so as to more or less hide the boundaries. This suggests an unlimited extent beyond what the eye can see at any point. Another means is by opening vistas between the trees, looking out upon distant scenes beyond the boundaries. In this way we may shut out undesirable objects, and we may appropriate to ourselves desirable distant scenes, such as a wooded hillside, a stretch of river or a church spire, and thus make our little grounds seem like part of an extensive park.

3. Arrange for trees to give comfort as well as ornament. One of the first considerations should be to shade the buildings from the heat of the sun and to shelter them from the sweep of the prevailing winds. On the south and west should be planted a few of the largest shade trees, such as elms or maples, not so close as to exclude the light from any of the windows, nor so that any of the branches, when the trees are full grown, will overhang the house, but close enough that their shade will fall upon it. In all planting the effect should be watched from the principal windows, and we must take into consideration what the result would be when the trees are full grown.

As a protection against the sweeping winds of winter some of the strong growing evergreens, such as the pines and spruces, are most useful. Thick belts or clumps of these should be planted in the most exposed quarter, and along with them may be planted a few of the light colored deciduous trees. In winter the evergreens give a cozy appearance to the place, and in summer their sombre darkness is relieved by the bright green of the deciduous trees.

In arranging the smaller trees and flowering shrubs these may be grouped into ornamental clumps, or occasionally fine specimens may stand out by themselves. When grouping into small clumps, the largest specimens should be planted in the centre, and along the borders the smallest shrubs should come to the front, so as to blend the grass with the taller trees in the background.

Beautiful color combinations and contrasts, both in flower and foliage, may often be arranged if the planter understands his work. For instance, a beautiful color contrast is obtained by planting a purple-leaved barberry near a golden-leaved spiræa, or a dark Austrian pine as a background for one of the light colored Colorado spruces.

Vines and Climbers. Among the vines and climbers we have a number of beautiful species which may be made very effective in many ways in beautifying the home surroundings. They are particularly valuable on small grounds and town lots as they take up so little room, but they are also quite as valuable in beautifying a country home. One of the most hardy and vigorous is the common Virginia creeper. This is excellent for covering a summer-house, a screen or any unsightly wooden wall. As a covering for a brick or stone wall the Boston Ivy or Ampelopsis Veitchii is one of the handsomest. In northern sections it requires winter protection for the first few winters, but when once established it grows rapidly, and will soon convert a brown or red front into a wall of living green. For a handsome, hardy flowering climber we have nothing to equal Clematis Jackmanii, with its large purple flowers, and Clematis Paniculata with its innumerable small white flowers late in the fall. Hall's climbing honeysuckle and the Chinese Wistaria are beautiful climbers well adapted to climbing verandah posts or festooning a balcony, but they will not stand our winters without protection except in the southern parts of the Province.

Walks and Drives. These are not in themselves very ornamental, but they are a necessity and have an important effect on the appearance of a place. When properly located they convey the idea that the place is inhabited, and they seem to impart an air of welcome.

As the walks and drives are artificial and not in themselves ornamental there should be as few of them as possible. Business roads should as a rule be straight, but pleasure drives give more pleasure if they are laid out in graceful curves. The curves give variety and help to relieve the angular outlines of the buildings. They should not, however, be introduced at the expense of utility, and should offer no temptation to take short cuts across the grass. Whenever a curve is introduced there should be trees or some other object in the road to make the curve appear necessary. If they are not there they may be planted when the drive is laid out. A curve without some apparent cause for it looks meaningless and affected.

The drive should wherever possible enter at the side of the lawn, and curve gently around towards the buildings as though it were the nearest and most natural way of approach. It should be dotted here and there along the sides with trees and shrubbery which partly screen the buildings from sight, so that we keep getting a different view of the house as we approach. This gives variety and pleasure, and always leaves just enough unseen to make us feel like following it up to see where it leads or ends up.

The width the drives and walks should vary according to their length and the amount of travel upon them. If long and much travelled the drive must be wide enough for two rigs to pass easily, but if short and not so much used, 8-10 feet or room for one wagon is enough. Walks or foot-paths will vary from 3-5 feet. The drives should be properly graded and made slightly crowning from the centre to the sides so as to give good drainage. If good gravel is obtainable they should be covered with gravel, raked smooth and rolled hard.

Fences. As a rule fences enter largely into most landscapes and are worthy of note. They are artificial materials, and at best they are necessary eyesores, but in the majority of cases their necessity is only imaginary. If all of the really unnecessary fences were removed, and the ground which they occupy levelled and seeded down or put under crop it would make a wonderful difference in the appearance of the country. It would remove a great harbor for weeds and insects; it would effect a great saving in labor and expense, and it would remove one of the most striking features which advertise the slovenly farmers all over the country. The only fences necessary, or which should be necessary, are those for the purpose of fencing in our stock, and not fencing in that of our neighbors. These, in many cases, might be movable or temporary. Roadside fences might be dispensed with, the ground levelled and seeded and the grass kept mowed from the boundary to the roadbed. Bill Nye says that "The farm without a fence in front of it looks as if the owner were honest and thought his neighbors the same." If a permanent fence is necessary let it be as inconspicuous as possible, or let it be an ornamental hedge.

Some of the other materials of landscape gardening are trees, trimmed into shape or out of shape, fountains and statuary, buildings, flower beds of geometrical designs. All of these artificial materials should be used with as much discretion as one should use in wearing fine jewellery. The more the artificial prevails in the general surroundings the more these can be used without giving offence. In proximity to large and expensive buildings, or in extensive parks, they may have their place, but on the farmer's lawn, where most of the surroundings are natural, and where the buildings are not elaborate and costly, they would be altogether out of place.

A KNOWLEDGE OF FRUIT GROWING.

By J. E. Farwell, Whitby.

Allow me to join in acknowledging the honor you have done our town by holding your present meeting here. Your meeting in this section of the county, where fruit growing has received considerable attention, will stimulate and extend here the great industry in which you are so actively engaged and so deeply interested.

Glancing through the reports of your transactions, and noticing the wide scope of your discussions, and the care and attention which the minutest details connected with your business have received, it seems a hopeless task for an outsider to say anything which will interest you or your visitors. Perhaps I may be pardoned for throwing at you some odds and ends about the subject.

There is no branch of work connected with the cultivation of the soil which so interests the young and old as fruit growing. One might hope that the injunction against covetousness was not intended for small boys. If it was they have been, are now and ever will be great sinners, world without end, as far as fruit is concerned. There have been good boys who have never cast longing eyes at ripe fruit belonging to others, but their goings to and fro on the earth have been as rare as angels' visits. Do not *we* know it? Have we not been there? And our successors in raids upon orchards and gardens, are they not with us to this day?

The old song, "Do they miss me at home?" was well parodied in the words:

> "They don't wish me at home, though they miss me,
> Dark nights were my desire for this reason,
> Some orchard I would visit alone,
> Next morning some farmer would mention
> My name with some fruit that was gone."

There *are* fruit growers who can manage to grow fruit where there are boys and yet have little trouble with them, and who are spared the annoyance of losing the finest fruit just about the time it is needed for exhibition purposes Allow me to suggest as a subject for a useful paper, "The experience and practice of the fruit grower who can so manage matters as to keep his fruit, his temper and the friendship of the boys."

It is well not to be too hard on the boys. Perhaps this desire to get good fruit, where it is to be got, is the effect of heredity. Our ancestors, the grand old gardener, Adam and his wife, had shown a liking for fruit that did not belong to them, and so furnished Milton with the material for England's greatest epic poem:

> "Of man's first disobedience and the fruit
> Of that forbidden tree, whose mortal taste
> Brought death into the world, and all our woe
> With loss of Eden."

This growing and caring for fruit is a most respectable, ancient and honorable occupation. You see it was practised by the "first families." Tennyson in his "Clara Vere de Vere," makes the young yeoman say to the Earl's daughter:

> "Trust me, Clara Vere de Vere,
> From yon blue Heavens above us bent
> The grand old gardener and his wife smile
> At the claims of long descent."

Before the first theft of apples humanity had an uncommonly easy time of it in dressing and keeping a garden without thorns and thistles in it. Perhaps they had not to contend with *Engonia subsignaria, Diosophila ampelophila*

aspidiotus conchi-formis and sixty more of the pests which trouble the soul and tax the enery and ingenuity of the fruit grower; at any rate they had the pleasure of eating their bread without sweating to get it. The man was turned out of the garden. Someone, I think Downing, says: "He has always tried to get back again." There is perhaps a disposition in man to take to a savage life, but if you can keep him within the bounds of civilization he is sure to go into the gardening business, a "fruit garden," a "root garden," or if nothing better can be had, a "window garden."

Throughout sacred and profane history, mythology and poetry we have abundant references to fruit and fruit growing. We find the figs, grapes, the pomegranates of Eschol and the olive trees of Gethsemane. We have the golden apples which Ge the earth presented to Hera on her marriage with Jupiter, and which the Hesperides were set to guard lest the same old game of apple stealing should go on; and it is said, that the apples were stolen by Hercules in the performance of one of his twelve labors.

Then we have the golden apple of discord which the unfortunate shepherd Paris had to award to the prettiest of three goddesses. Of course he pleased no one but Aphrodite to whom he awarded it, and so caused the Trojan war. "The sour grapes" which the fox could not reach, the disappointed hopes and crushed expectations of mortals, like

> "Dead sea fruits which tempt the eye
> But turn to ashes on the lips."

When one has amassed a fortune of five hundred thousand dollars he has a "plum" two hundred and fifty thousand is "half a plum." The plunger on the race course or in Bank stocks is bound to have a "plum" or a "plum stone." Of all the fruits, the poets seem to prefer the apple, one of them says:

> "So sweetened with the Summer light the full juiced apple,
> Waxing over mellow, drops in a silent autumn night."

And just then and there Sir Isaac Newton, the philosopher, seeing the apple drop *down* wondered why it did not drop *upwards*, like a puff of smoke, and then he sought out and thought out the great law of gravitation.

Why not plant apple trees along side the highways for the wayfaring man, the small boy, and for the poor and needy? Their shade is quite as good as that of many other shade trees. I have pleasant recollections of seeing somewhere in Europe rows of apple trees upon the sides of the highways "where fragrant blossoms fringed the apple boughs."

Do people realize the advantages of planting apple trees or other fruit trees? Do they realize that while they contribute to the beauty of the landscape they tend to refine and elevate the owners? Bryant has said:

> "What plant we in this apple tree?
> Sweets for a hundred flowering springs,
> To load the May winds restless wings,
> When from the orchard row he pours
> Its fragrance thro' the open doors,
> A world of blossoms for the bee,
> Flowers for the sick girl's silent room
> For the glad infant sprigs of bloom
> We plant with the apple tree."

Show us a country where there can be raised good wheat, good apples, and good speckled trout, you have shown us a country where a white man can live and be glad that he is alive, for there he is sure to find a good soil, a good climate and good water.

Cannot our schools be made to contribute to the success of the fruit growing industry? Cannot pupils be taught not only to refrain from injuring fruit and other trees; but also have inculcated a love for them and a thorough appreciation of the advantages to be derived from them? Can they not be impressed with the idea of the millionare founder of the Gerrard College that if he knew he should die to-morrow he would wish to plant a tree to-day, and so have done something to leave the world better than he found it.

I have for a long time had a theory that it would be a great benefit to the people of this Province if the study of Latin, Greek, German and French were discontinued in one-third or one-fourth of our High Schools and Collegiate Institutes, and that manual training and instruction in the use of tools and implements and in subjects having a practical relation to agriculture, fruit growing, mechanics, manufacturing and mining should be substituted therefor. When one remembers that the number engaged in teaching and other professions is but small compared with the great army who are engaged in agricultural, mechanical, manufacturing mining and commercial pursuits, and the small amount of taxes paid by professional men as compared with the large amount paid by the producers of wealth, one might well suppose that the struggle would have all along been, how to raise the means for paying instructors in these languages and that there certainly have been found in every county at least one school for teaching all that could be taught there to aid the great producing classes in their struggle for existence.

Can such subjects be taught under such surroundings as will keep the pupils in line with their intended occupation and not sidetrack them into the professions? Is it not a well-founded complaint that when once the boy, whose parents desire him to follow farming or a trade, or to engage in business, gets into a high school there is but small chance of getting him back to the farm, the workshop or the store? Sir Lyon Playfair says that "schools should aid boys in discovering the class of knowledge best suited to their mental capacities, so that knowledge may be specialized to cultivate the powers of men to the fullest extent."

If the carrying on of agriculture, mining and manufactures in the best possible manner is of any importance to this country, it is about time some provision was made for schools which will "mould the minds of boys according to their mental varieties. By the adoption of this plan, boys not destined for the professions would receive the same instruction in English, mathematics and commercial subjects as those who are to take up a profession. The sons of farmers would receive instruction in zoology and botany, which would explain the blights, the insects which attack the grain, roots and fruits, and the means of preventing injury from these as far as known, the value of different kinds of manures and the relation of chemistry to agriculture. The teacher of science would give instruction in mineralogy and geology, particularly as to exploring for valuable minerals, how and where to find them, and what to do with them when they have been found. If the mineral wealth of this country amounts to a tithe of what it is reported to be, it is time more of our young men were being instructed in the above matters. Is it not time the experiment was tried? One-third of the expenditure of the public money for schools at least, should be in the way of practical education. Have we yet exhausted the agricultural and fruit-growing capabilities of Ontario's soil? Is there anything in it yet for the farmer and the fruit grower? And are there not yet abundant opportunities for making a living for independence, nay, for a competence, to be found in cultivating the lands of Ontario? Will not the teaching of subjects in connection with pursuits in which the pupils are to engage tend to hasten an era of prosperity which the Province has never known?

THE SAN JOSÉ SCALE.

By G. T. Powell, Ghent, N.Y.

A request has been made that a few words might be said here upon the threatening danger from the San José scale to the fruit-growing and other interests of this Province. In a very brief manner let me point out the fact that the greatest hindrance to the profitable pursuit of horticulture is from the insect damages that come to trees and to fruits. I want to mention only one or two illustrations. A little more than ten years ago there was introduced into Massachusetts what is known as the Gypsy Moth. An entomologist from France brought over to this country a few of those Gypsy Moths to cross with the silk worm, thereby hoping to get an improved silk worm that would be of great value to America. While he was experimenting with these few Gypsy Moths there came a gust of wind that blew a few of them out of the open window near the vicinity of Boston. He closed his window, went out immediately, but he could not find them. No further thought was given, but about two years after that there was discovered near Boston the ravages of a caterpillar that was becoming somewhat alarming. The forests were being denuded of their foliage, and that was the introduction into this country of the Gypsy Moth, with its very destructive work as it is being carried on to-day in Massachusetts. It has cost the State of Massachusetts nearly one million dollars simply to hold it in check. The annual appropriations are to-day $200,000 just to keep it within limits near the city of Boston. It has denuded their parks, and it has entered their forests, and if it gets beyond the control of the present commission, it threatens to destroy the vegetation of the State of Massachusetts. The Gypsy Moth deposits its eggs in the grass, in the trees, anywhere, in the stone walls, in the crevices of rocks, and it requires to day a force of 500 men who are to-day fighting it along different lines with fire, even going into the rocks and the stone walls and injecting kerosene oil, and fire to follow it—this is the manner in which the Gypsy Moth is being fought. Men are being sent to the tops of high trees, great oaks and elms, with ropes fastened about their waists. They swing themselves out to the outermost branches of those great trees, there to pick off those egg nests, and you can imagine the great amount of labor required to just simply keep this great pest in check. Now the Brown-tailed Moth is even worse than this. The Brown-tailed Moth multiplies so rapidly that when the caterpillars begin to migrate they simply cover the sidewalks and the streets. They also cover the sides of buildings and they get inside the houses and into every part of the house—into the closets and into the drawers and bureaus, and into every nook and cranny. During the month of September last they were so numerous upon the streets of Lynn that the horses and vehicles passing over the pavements, and the people walking along the sidewalks, crushed them in such numbers that during the hot month of August the city of Lynn was threatened with a pestilence. Now, these are illustrations which I have mentioned to point out the importance, in the discovery of a serious insect pest within your territory, that the most vigilant means be taken to stamp that thing out upon its first discovery if possible.

Now the San Jose scale comes in here at this time as a threatening danger to our horticultural interests. It was my privilege during the past winter to have spent several weeks in Maryland attending the fruit growers' meetings and farmers' institutes. I saw the workings of this pest where it had committed its worst ravages in that state. I remember passing along and through one peach orchard containing 27,000 trees, and every tree destroyed, absolutely dead, in that peach orchard from the effects of the San Jose scale. So you can see the extent to which the damage is perpetrated when an orchard of this number of trees was absolutely destroyed by this Scale. It is surprising how the Scale is

spreading not only in the states, but here in your own country; and it becomes of the utmost importance that the Ontario Fruit Growers' Association in its work shall point out, as it is doing so wisely, the danger that threatens your great horticultural interests from this pest. We have much to learn about it, more especially in relation to its control; but this fact is evident, that while it seems to do its worst work in the warmer climates, yet it is possible for it to become acclimated almost anywhere, and there is where its danger lies. There do not seem to be at present parasites that are following it up. That is the trouble with the Gypsy Moth of Massachusetts. The parasites which keep it in check in France do not exist or are not here, and hence the moth has its full swing, and therein lies its great danger. In New York state we have the Scale to a far greater extent than I desire to admit. It is surprising where we are meeting it. In my own county of Columbia, along on the Hudson River, while conducting a series of lectures upon natural sciences touching upon the point to which the last speaker so forcibly alluded—the necessity of introducing into our public schools the studies of natural sciences, which may be applied to agriculture and horticulture—going through those beautiful gardens and orchards to discover some insect life that had been treated during the afternoon lectures, I was surprised to come upon a beautiful pear orchard, and in the centre of it found fifty trees that were in a declining condition. In calling the attention of this class of boys and girls to these trees they saw at once that the trees were from some cause not thrifty, that they were declining. We walked into the orchard to study the causes that could produce just in this one circle, about fifty trees declining and dying, and to my surprise came at once upon the San Jose scale. Not a single inhabitant of that section dreamed or supposed for a moment that that pest was in their midst. Upon putting the microscope upon it to be absolutely certain, the word was sent home by these children to say to their parents that they had one of the most dangerous pests in their community that possibly could have reached them. The result was that within twenty-four hours an invitation was extended to hold a horticultural meeting near Germantown to discuss the question of the San Jose scale and every fruit grower of the town was present when that meeting was held, that he might know all that could be learned about it, a special entomologist having come to attend this meeting. It has since been known in many portions of New York State. One of my own neighbors within eight miles distant of me has it in his apple orchard, in his pear orchard, in his peach trees, on his plum trees, on his raspberries, and in fact it seems as though it attacks almost all kinds of trees and plants; so that it becomes of the utmost importance now that we study this Scale in its habits and in its possible control. It is so important that it seems to me it is within the function of the Government that it shall lend its aid—which I am certain it will—in the annihilation, if that be possible, of this Scale. One of the discouraging features of this whole subject is the questionable fact that perhaps it never can be annihilated when it once gets a foot-hold in a community. When we consider that one pair will become the progenitors of something like three billions in a single season you may understand the gigantic effort that must be made to annihilate an insect like that, one that spreads with such wonderful rapidity, one that multiplies to such a wonderful extent. You may at once understand that it is a pest that cannot be lightly dealt with in its extermination. There might be very much said in regard to its treatment but that subject, I think, is to come up again, and hence it will not be necessary for me to go into a detailed discussion of that Scale now. We have been trying to estimate the damage that comes to New York State from the insect pests that afflict our fruit trees and forest trees, our shrubbery, our green crops, and our live stock interests. During a very careful study made four years ago into the condition of agriculture in New York State, and the causes that were sending populations adrift from the rural districts to

the cities, this fact was elicited in this study of the causes which were making agriculture in New York State so discouraging: On application to the State Entomologist, Dr. Lintner, to give me a careful estimate of the annual losses which come to the territory of New York State from the insects, his reply was, after a very careful study of the subject, and from reports which had been made for several years previous, that the annual loss to the people of New York State from insect depredations alone were not less than $26,000,000 annually. Now, that is appalling. And is there any wonder that farmers and fruit growers become discouraged, and sometime perhaps abandon their holdings and go to the city, hoping there perhaps to meet the wants of life easier? Is it any wonder that there is a drifting away from the soil, when $26,000,000 annually, year after year, is the loss that comes to the cultivators of fruit and the cultivators of agricultural productions? That, it seems to me, is appalling; and there is no line of work that your Association can do so valuable to your people as to follow up now persistently this San Jose scale, and watch for the introduction of any other insect pest that may come here and cut down your profits in this most delightful work of fruit culture, if it were not for the damages which follow from this cause.

TREASURER'S REPORT, 1898-9.

Receipts.			Expenditures.		
Balance on hand December 1, 1898		$784 96	*Canadian Horticulturist*	$2,499 38	
Membership fees	$4,087 77		Salary Secretary-Editor	1,200 00	
Advertisements	636 67		Commissions	673 93	
Samples, etc	19 60		Plant distribution	560 68	
Bound volumes, etc	13 40		Illustrations	419 12	
Government grant	1,800 00		Affiliated societies	247 65	
		6,557 44	Printing and stationery	213 15	
			Directors' expenses	206 57	
			Bookkeeper	153 00	
			Postage and telegrams	143 60	
			Reporting	104 10	
			Express and freight	76 75	
			Committees and delegations	74 59	
			Advertising	35 60	
			Binding *Canadian Horticulturist*	29 64	
			Collection and interest	27 30	
			Auditing	21 00	
			Miscellaneous	10 50	
			Books	7 33	
			Caretaker at annual meeting	3 00	
					$6,706 89
			Balance on hand December 1, 1899		635 51
		$7,342 40			$7,342 40

Upon motion of Mr. A. H. PETTIT, seconded by Mr. E. D. SMITH, the report was adopted.

A. H. PETTIT moved, seconded by Mr. PATTISON, that the minutes of the annual meeting be taken as if read, they having been printed in the Annual Report. Carried.

ELECTION OF OFFICERS.

The election of officers was then proceeded with, and resulted as given on page 4.

REPORT OF FRUIT EXHIBIT COMMITTEE.

Your committee on Fruit Exhibits begs to make the following report:—

The exhibition of fruits made this year is above the average, both in size and quality, notwithstanding the light crop. It is gratifying to the committee to find that so many of the members of the Association took the trouble this year to bring some samples. It is inconvenient for members to bring large exhibits from long distances, but it is very little trouble to bring a small collection of those varieties which will be of greatest interest.

Mr. W. M. Orr, Fruitland, Ont.: Exhibited three varieties of pears, two seedling apples, and two plates of fine Vergennes grapes. The seedling apples were not of special merit.

E. Morris, Welland, Ont.: Plate of fine specimens of the Horn apple, said to be a very late keeper.

E. Lick, Oshawa, Ont.: Fine specimens of Fallawater and Cranberry Pippin apples, and another variety.

Jos. White, Whitby, Ont.: Plate of Ontario apples.

R. L. Huggard, Whitby, Ont.: A large collection of apples and pears. Among the newer apples being Bismarck and Salome. His samples of Salome were particularly good.

A. M. Ross, Whitby, Ont.: Plate of quinces grown at Whitby, which were of fair quality.

W. H. Dempsey, Trenton, Ont.: Collection of 19 varieties of apples, many of which had not hitherto been exhibited before this society. Among those shown were:—Jefferies, Mammoth Black Twig, York Imperial, Windsor Chief, Parlin's Beauty, Maclean, Winter Banana, La Rochelle, Boiken, Duffy's Seedling, Pioneer, Rome Beauty, Beaton Co. Beauty, and Trenton. Among those worthy of special mention were: Maclean,—A yellow, medium sized apple, mild subacid, very tender flesh, pleasant flavour. Winter Banana,—A large yellow apple with a pink blush, very tender flesh, mild subacid, high flavour. Duffy's Seedling,—A Californian seedling above medium size, bright red, conical, subacid, medium quality, a very attractive apple; season probably March. York Imperial,—A red winter apple which will probably be grown more in Canada in the future.

Central Experimental Farm, Ottawa: Twenty-one varieties of apples were exhibited. Gano, Patten's Greening, Shiawassee Beauty, and Milwaukee, were varieties shown which are succeeding well at Ottawa but are not yet very generally known.

Charles Young, Richard's Landing, Ont.: An apple for name. This is probably a Russian sort called Grandmother.

Harold Jones, Maitland, Ont.: Some fine specimens of the Scarlet Pippin apple. This is a very fine looking apple of good quality which Mr. Jones says brings a better price than Fameuse.

G. C. Caston, Craighurst, Ont.: Specimens of Gano and Boiken apples.

Burlington Horticultural Society: Plate of Baldwins.

W. M. Robson, Lindsay, Ont.: Sent specimens of McIntosh Red and an apple for name which was found to be King.

C. W. Smith, Whitby, Ont.: A very fine plate of Northern Spy apples.

Smith & Reid, St. Catharines, Ont.: Good specimens of Princess Louise apples, also three varieties of pears.

R. W. Shepherd, Como, P.Q.: Some fine specimens of Winter St. Lawrence apple.

Mr. Carpenter, Winona, Ont.: Two bushels of apples, one from the top of a barrel, and one from the middle. The difference was very marked.

Some other fruits were placed on the table after the committee had finished its work, and opportunity was not afforded to include them here. Some specimens also were not labelled.

W. T. Macoun, (Chairman).
E. Morris,
W. H. Dempsey,
C. W. Van Duzer.

REPORT OF COMMITTEE ON OCEAN AND RAILWAY TRANSPORTATION OF FRUIT.

Mr. W. H. Bunting, speaking on behalf of the Committee said: There are two sections of this matter that are important to us as fruit growers—the question of service and the question of rates. As I understand it, this Association for the last thirty years has been making efforts largely devoted to the improvement and cultivation of fruits—efforts to provide for this country a finer class of fruits, and more abundant. During the past few years the results of the efforts of this Association and of individuals have been very apparent. There is no doubt that we have succeeded as a class in producing an abundance of good fruits, and each year the output is rapidly increasing. The time has come when better distribution of the products of our soil and orchards and vineyards is very necessary. The claim is made sometimes that we are producing more fruit than the country will take. It may be possible that in some lines we have been doing so; but in looking the question fully in the face it has impressed itself upon my mind that we are not at the present time producing, except in seasons of occasional glut, very much more than we require; but that it is the difficulty in presenting to the consumers of our country and of the home land the products of our farms and of our orchards in a good condition and quickly that has occasioned the trouble in connection with this. It is a deplorable fact that during the past few years, particularly in 1896 and 1897 in the Niagara District, from which I come, that a large proportion of our fine crop of peaches and apples in those two years was allowed to go entirely to waste, and the business for the time being was in a completely demoralized condition. Now, this is lamentable, and in spite of the fact that there are sections of our country that even during those years stated time and again that they did not receive the quantities of fruit that they could have used to advantage. In connection with the two phases of this question—that of service and that of rates—it is very apparent that we need relief, and we need improvement in both lines. The question of rates largely depends upon the individual transportation companies. Each company has a free hand to improve their service in whatever way they see fit. When it comes to the question of the reduction of rates or more favorable rates for the grower, that is a question in which all the transportation companies are interested; and as far as the railway companies are concerned, no single railway company is in a position to make a rate that would be detrimental or would not be concurred in by the other roads. So when we come to that question we have not only to meet one company but all, and we have to satisfy them that the claims that we present are reasonable and just and should be considered. I may say that we have not at the present time the facilities in the shape of service that we should have. While some little effort has been made to supply during the season refrigator cars for the better transportation of our more perishable fruits by freight, yet we have not received from the railroads the consideration that we should have received in that respect. We require a full equipment of suitable ventilated cars for certain classes of our products, and we also require a good refrigator service during the hot months of the summer for the proper distribution of our fruits

throughout the country. There is this difficulty with which we have to contend and one that is pretty hard for us as a class to get over. We will be met time and again, in asking for better accommodation, with the reply and the objection that our trade is not regular—that we are not in a position in the early spring to guarantee to any transportation company a certain output, and consequently our wants being irregular, and being dependent on the season, they are not willing or it is no object to them to provide in advance a sufficient equipment that may possibly not be needed during the season. Now, we cannot get over that altogether; but as a class in the various sections of our country, by co-operation and by planning during the earlier seasons, and planning one year for the future, we can, it seems to me get into a position whereby we can offer some reasonable guarantee to the railway people that if they provide suitable accommodation that accommodation will be utilized. I may say at St. Catharines during the past two years something of that kind has been in course of organization. We have been endeavoring to co-operate and to consolidate our shipments as far as we possibly could, and by so doing to offer to the railway people there a sufficient quantity of goods at a time that would justify them in supplying us with suitable accommodation and in making an effort to give us a service that would be satisfactory. Now we can increase that, and as our acreage and output increases year after year that objection will be less and less; but it certainly is at the present time one that is quite serious. The same thing applies to the ocean service. We will be met time and again with the reply from the steamship companies, "Your trade is so intermittent and so uncertain that it does not justify us in going to any large expense in providing for it;" and part of the season of the year when we require accommodation all other classes of people are clamoring for the same thing. The only solution of that point is as I said, the various sections co-operating, the growers having mutual confidence in each other and endeavoring to assist each other in providing for the transportation companies a sufficient quantity from time to time that will make it worth their while to cater to our wishes. In connection with the question of rates, I may say that at the last annual meeting of this Association a committee was appointed to confer with the transportation people in an effort to secure better rates. That committee was quite a large one, consisting of Mr. E. D. Smith, Mr. Carpenter, Mr. A. H. Pettit, Mr. Murray Pettit, Mr. Orr, the Vice-President, Mr. McNeill, of Walkerville, and myself. We had several meetings, discussed the question fully, and then having done so met with the Traffic Association at Toronto, presented our views before them, asking for certain reductions in the freight charges. We did so on the ground that the fruit industry had never yet received any reduction in freight charges, and that owing to the largely increased output of fruit, that fruit at the present time was deserving of some consideration from the railway people, particularly in view of the fact that there was scarcely another industry that had not in some way or another been recognized by the railway people and had received some concessions. We presented before that committee a series of requests, which I may just as well read at this juncture. Having gone over the classification of freights we found that fresh fruit was classed at the first class in carload lots; that there was no classification for fruits in cases or boxes for export whatever, but that if they were shipped in that way they must necessarily go under the first class; that grapes that had been shipped for wine purposes—that had been originally under the fifth class—had been restored to the third class; and that apples in barrels for shipment in Canada were at fifth class at that time. Looking over these particular items we felt that in connection with these various points we had reasonable grounds for asking for concessions, and consequently we asked that these particular lines of fruits be reduced materially in the classification. I may say that the Traffic Association took that matter into some little consideration, and for the present we were unable to bring pressure

enough to bear upon them to succeed in getting them to give us the concessions that we asked for, and that we considered reasonable and just. However, they made a concession that from that time grapes only should be reduced one grade in the classification. Now, that concession would amount to from $10 to $12 per acre on every acre of grapes that went out of the Niagara District and the Essex District, on the basis of the Montreal rates. That is the amount of the concession we have got up to the present time. Having received that information from the Traffic Association, we applied to them again to have that concession applied to mixed fruits, no matter what they might be, not to grapes only. Up to the present time we have not succeeded in having the railway people agree to that point. I feel that in connection with this matter of transportation and rates we are but on the threshold; that the prospects of improvement are very bright in both ways; and not only that we feel we have a just claim, but that the attitude of a good many of the railway people is in our favor, for there may be opposition from those who may be more particularly interested. Still it has been stated to me by our railway people that they consider our claims were just, and that the railway requires only a little more determination on our part, probably a little stronger pushing of the matter to the front.

Mr. HUGGARD: Did the committee discuss the question of local rates from the separate points on the railway? For instance, the Hamilton and Grimsby people have facilities that the people of Whitby do not. That is to say in smaller quantities than a car load, you can ship cheaper from Hamilton to Montreal than we can from Whitby. This is a very important matter to us along this line. I quite agree with the sentiments expressed. As it presents itself to us here, it seems that the rates are greater from here to Montreal—so much greater than from Burlington and those points, that pressure should be brought on the railway people to equalize it in some way. As a matter of fact, this last season California grapes were landed in Montreal at something of a less rate from Chicago than they were from Toronto; and this should be brought to the notice of the Grand Trunk.

Mr. BUNTING: I may say in connection with the question of local rates, or less than carload shipments, that the railway people are very reluctant to interfere with the less carload rates in connection with our fruit shipments. They consider that less than carloads rightfully belong to the express companies, and do not wish to interfere in connection with that matter. That is the argument that is brought to bear, As far as concerns the rates being out of proportion on the shorter distance, I do not think we took that matter into consideration. I do not think we had any data given to us in connection with that matter, and it will be one for further investigation.

Mr. HUGGARD. I would like to ask, too, whether the committee investigated the charges that the express companies choose to put on us. It simply amounts to this, that when our goods land in Montreal, unless there is a pretty good market there the express company gets about the whole of it; and we want to stop this—we want a little share of it here. The rate from here to Montreal is simply ridiculous as compared with the freight rates on the Grand Trunk. As a matter of fact most of the fruit shipped from Whitby station this year went to Montreal, and in some cases took five or six days to get there, which is ridiculous too; and I think this ought to be discussed, especially with regard to perishable fruits.

Mr. CASTON: I will move the adoption of the report in order to bring it before the meeting. This is a very important subject, indeed. We all realize the difficulty this committee has to deal with, and we must not expect too much from them at once. It is a difficult matter to deal with a large corporation. It is a well-known fact in regard to the short haul that the situation is this; the long trunk lines are competing for through traffic, competing to such an extent

that the profits of through traffic are very small indeed, and they are making the dividends out of the local traffic and the short haul. That is the exact state of things in this country to-day ; therefore this committee has a difficult matter to deal with in getting the reduction of local rates. But it has a great deal of work ahead of it, and I think that committee ought to be continued. There is not only the question of railway and express transportation, but I think this committee will be able to effect something better in the way of improved conditions for the ocean transportation for freight. It appears to me a shame and disgrace that so much of our fruit, even that which is well packed—leaving aside the question of fraudulent packing—arrives in the Old Country so-called " wasted " and " slack " and " wet." Now, we have a better route from this country than from any other, and if we can get the steamship companies to give us the temperature of the ocean air itself, our apples would carry perfectly well. Why should they deteriorate so much in the short space of say two weeks in their passage across the Atlantic ? There is something seriously wrong there, and if this committee can do anything in that line they will be doing a great service to the fruit growers of this Province, because it is getting to be a very important part of our industry.

Mr. Scarff seconded the motion to adopt the report.

A. H. Pettit : The object of this committee was to get our goods classified differently. Whatever class our goods are shipped under, carries with it a certain rate. We were not dealing with local rates or with express companies, but with all the railways of the country for the shipment of fruits of all kinds, and to change the classification from No. 1 to No. 3, or No. 3 and No. 5 to a different class ; and whatever class you get in, that carries the rate. The work of the committee was quite different from going and getting special rates for this locality or that locality to ship their goods. It is a rate that covers the whole business with the railroad companies, and all railroads.

E. D. Smith : As a member of that committee, I with the others met in Toronto and discussed this question in all its bearings pretty well. It seems to me that for a number of years we are wasting ammunition in attempting or expecting to do very much in compelling the railway companies or steamship companies. We have been doing that ever since I have been in the fruit business. We went there with a very strong case decidedly, but as Mr. Bunting has said, all the railway companies are organized in an association called the General Traffic Association. You can not go to them individually and ask one to do something in order to get freight away from the other company. They are so combined and united that they practically have the situation right in their own hands. They have us in their power ; and altl. ugh this committee secured a slight concession, it was just, as I looked at it, a little sop thrown to us to pacify us. It did not amount to very much. It was worth the effort, though, and it may be worth while to continue it, and urge them, and get little sops thrown occasionally to help us out ; but I think we shall never with regard to railway rates secure our just rights any more than we have with regard to the accommodation on steamships so long as we depend entirely on an appeal to their generosity. Corporations, as is often said, have no souls. They look at it entirely as a matter of business. They have this trade in their hands, and we cannot help ourselves. We must take the rates that they offer to us. Now, there is only one way of getting what we want, and that is by compulsion We want to look around and see what lever we can get hold of that will move them ; for compulsion, as I have maintained for many years, is the only thing that will affect the railway or steamship companies ; and the only compulsion that I know of is the Government of the country. We have heard a good deal for years about appointing a railway commission. It seems to me that is the only relief we can get from the railways. We should have a commission conducted at not too great an

expense, before whom we can lay our grievances, and who would have power to compel railway companies to make fair rates,—that is, fair to all parties,—and not charge fruit growers excessive rates because they are scattered and distributed, and have not got a pull or lever that some other industry has. This commission could compel to give fair rates to all parties, and reasonable rates taking into consideration the length of the haul. It has been said here to-day that the long haul pays the little profit, the short haul pays the big profit. You know gigantic efforts have been made in the United States to overcome that difficulty, and something has been done. Possibly by means of a railway commission something could be done here, A much greater grievance—though I understand you do not wish to discuss that now—is the ocean transportation. That is a matter of very much more importance even than the railway rates, and the only way to get at that is through the Government. Would it not be advisable for this meeting to point out the way in which this committee should act, and the lines on which they should go? It might interfere with the results we might achieve, if we were to attempt to take up the local rates from different local points.

Mr. CASTON: Of course there is this difference that Mr. Huggard did not take into account: Here there is only one railway, whereas the Hamilton people have the competition of two railways.

Mr. BOULTER (Picton): We have had experience in our Packers' Association of which I am President, We were handicapped in the exportation of our goods to the old country. At first very little was conceded, but we approached them and kept at them until we succeeded in getting the classification changed, which made the rate a little different. Do not give up. We did not. When we could not get our goods to Montreal by rail from the local points for the rate, we shipped by water, and got rates then from Montreal through. Put men on your committee who will take the time and work and interview this Traffic Association. We got our classification reduced, and we also gained on our local traffic. We got a rate to Vancouver or Victoria, also to Winnipeg, the same from all parts of Canada—the same from, Montreal, Toronto, Picton or any other point. Now, I would not give up trying to get better rates. It is rates that guide and govern the success of the men in any business in which the old country is the market. I would like to see an efficient committee hammering away on that business; but the whole point in getting a good rate is getting a good price at the start.

The motion to receive and adopt the report was then put and carried.

The SECRETARY: I would move the continuance of the committee for the new year, Messrs. Bunting, Pettit, Smith and Carpenter, and that they have power to deal with both ocean and railway transportation. It will be interesting for you just now to hear the resolution agreed upon regarding the former, a copy of which was forwarded to the Dominion Minister of Agriculture.

"Whereas, the accommodation on Atlantic steamships has hitherto been unsuitable to the carriage of our fruits, even such hard fruits as apples being ruined in transit and arriving in the British market in an unsalable condition, although in perfectly sound condition when packed and shipped, and

"Whereas, the lack of ventilation, and the great heat in the holds of the vessels, added to the heat arising from the fruit itself, contributes to this evil, which has resulted in immense losses to the fruit growers in every Province of our Dominion.

"Therefore, resolved, that we memorialize the Department of Agriculture at Ottawa to take steps to remedy this serious condition of affairs, and thus give encouragement to one of the most important branches of industry, and that inspectors be placed at the more important ports, as Montreal, St John and Halifax, whose duty it shall be to see that such ventilation is attended to, and, further, to insist upon proper care in handling, loading and storing of our fruits on shipboard.

"Further, that, when cold storage for fruit is provided on shipboard, the steamship companies shall be required to guarantee that the temperature will be kept within certain limits, and that the same be verified by a self-registering thermometer placed under government seal."

Mr. CASTON: I second that motion. We have overlooked our very important home markets. We have a large market in the Northwest, and there is the question of transportation there—whether we should use ventilated cars or ice cars

to see that there are proper facilities for re-icing those cars and delivering the freight in proper condition. There are great complaints coming from Winnipeg, Portage la Prairie and those western cities as to the manner in which fruits arrive from Ontario. That is a question that would come within the purview of this Committee as well.

The motion to re-appoint the Committee was carried,

COMMERCE IN LARGE FRUITS.

Prof. J. W. ROBERTSON, of Ottawa, said: Mr. President and Gentlemen: I regret very much that other public duties kept me from being here to profit by the discussion that has taken place on the transportation of fruits. Transportation is a very important part of commerce, but not by any means the most important part of the commerce of fruits in Canada. If I may say one or two words in regard to commerce in general I think you will be in a better position to understand what I would like to indicate; and be better able to learn from you what our department needs to know from the men who are practically engaged in this business. Commerce is the exchange of things—of commodities. It is not a mysterious philosophy. It is the exchange of commodities—something for something. That is not stock-broking, and is not speculating in shares. These phases of business operations may be right or wrong, but they are not commerce. Commerce is essentially the exchanging of commodities. One of the essentials for success in commerce is to have a commodity to exchange which in itself will get you a relatively large value because it is in good demand or in other words because many people want it.

In making the exchange, transportation comes in; and the better the transportation the more easily can the exchange be effected; but it does not necessarily affect the *essential quality* of the commodity you have to offer or of the money you may get for it. Unless the two—the commodity and the money—are good at both ends, safe commerce is impossible. I need not discuss safe money, because we have in the British Empire no question of the soundness of pound or the dollar. (Applause). The question is to get enough of them. (Laughter).

Fruit-growing in Canada has been adopted by a great many people who have not taken any trouble to learn how to carry it on. One has merely to look at the fruit trees that dot the face of the country to see that that is the case. It is shown by their kind, and their condition, and their general behaviour. There are some orchards that denote skill on the part of the man who manages the orchard; but for each such orchard I think there are ten orchards which are left to take care of themselves. The powers of nature take some care that the tree will be hardy and have some kind of fruit that will have seeds to reproduce it. The fruit-grower is after another object. He is after fine fruit to sell for a good price. The fruit-growers have been chiefly growing the varieties of fruit that grow easiest. Those may promise them a chance to hit any kind of market at any time of the year. We have too many men who have "loaded" their orchards to hit anything in general, but no market in particular, therefore they don't hit any market in particular.

We need to have a few sorts and varieties of large fruits, and these in reasonably large quantities in each locality, else the general commerce in large fruits cannot make progress. Let me give you an illustration of that. We find Canadian markets during most of the fruit season filled with fruit from the United States. That's the fact. Why is it so, when we in Canada say we have more fruit than we can take care of, and are looking for outside markets—

outside markets, with the very same sorts of fruit? The United States fruit that comes here has a uniformily good appearance throughout the package. That is worth a great deal. I talk to my friends in Ottawa, "Why do you buy those Californian fruits?" "Well, the fruit in the case is all the same." I say to the shopkeeper, "Why do you buy these?" "Well, I have no wasty ones in them; they're all alike." These two specific reasons, you see, are at the very threshold of commerce—are put there by the men who have the money to give in exchange. I mean the shopkeeper and the consumer. The Californian fruits have good keeping qualities. We may think that our climate and soil give a far better flavor, and I think they do in nearly all sorts of fruits; but the consumer says, "I want good-looking sound fruit, that is fairly uniform all through the case."

I come next to deal with the personal, particular market. There is such a market in every town in Canada, which the fruit-growers around these towns should be able to supply. The commerce of the locality is worth looking after. It is far better worth looking after than the commerce in the foreign markets. Every town in Canada would consume twice as much Canadian fruit if the people could get Canadian fruit of uniformly good size and good quality—not at a lower price; that is not the point. They are able and willing to pay a higher price than they have been paying. The question is one of fine quality throughout the whole package, with every fruit in good condition. The home, the house market will take all kinds of fancy, large fine fruits at double the price of the general market for export. I am talking of the town I live in and other towns. Why not meet that great unsatisfied market, and grow especially for it. That is where the money is made mainly.

Then there is the general home market—I mean the market that is like our wheat market, the general market for the general good quality. The market of the North-west and Manitoba is a large market and a growing market for Canadian large fruits; but if any of you went to Manitoba and tried to reason with a Winnipeg man as to the desirability of taking Ontario fruit instead of United States fruit, he would smile and tell you he knew his business, and that you didn't; that he had tried Ontario fruit many times and that there was so much loss and waste that he could not stand the risk, and he wasn't going to try it again. I don't know whether what they say is all correct, but they are the men who have the money. They are unwilling to exchange what they have for what we want to give them, and that is what they say. I have personal letters from men in the North-west, and they say, "We bought a barrel of Canadian apples, and the top looked nice, but the inside wasn't the same." That is what they say. (Laughter). I don't know how it comes about that the small, inferior apples gather in the middle of the barrel. I have never been able to account for it except in the light of a paper read at your annual meeting in St. Catharines which explained it admirably and completely. The fruit-grower assured us that ever since Eden the devil personally inhabited each individual apple, and then moved his habitation about after he got in the barrel. (Laughter). I don't know any other way of accounting for it.

I want to get your minds on the line of our greatest need for improvement. I have been hinting at these things—a uniformly good fruit all alike throughout the package; uniformly sound condition, with good-keeping qualities for the shopkeeper and the consumer; and then excellent superior quality for those people who are willing to pay extra for such. For the general export market we need similar improvement. Every mail that comes from England brings me word like this: "What we want in Canadian fruits first of all is soundness and good-keeping qualities, and nearly uniform size throughout the package." That is what they want. Then they want also a nice appearance—as large a size and as fine a color and as good a shape as can be had. After that they want fine flavor. I have

letters here saying that the Keiffer pears were taking better in the market last year than before. Now, who is going to stand up and brag about the Keiffer pear for quality or flavor or flesh? But for sound-keeping quality they are quite the thing; and that is what the commercial men who have the money say about that pear—that it is taking better this year than it did the year before, and there is a reasonably good prospect for it. If we can get an equally good-keeping pear and equally good-looking pear, or a better-looking pear, with superior qualities of flavor and flesh, that is the one to send. I mention the Keiffer just to show that they are after these things first—soundness and good-keeping quality.

The Department of Agriculture made trial shipments this year. I shall make a few brief observations on them. These were trial shipments mainly of pears, of peaches, and the more tender sorts of apples. We sent altogether only 127 cases of peaches, 3,746 cases of pears, 1,456 cases of apples and 82 cases of quinces. The main shipments were pears and tender varieties of apples. The peaches were packed in cotton batting, so as to protect them against any possibility of bruising, and also against the warm, damp air of England when they were taken out of cold storage. Here are the returns,—not very good in some cases. We sent not more than 30 cases at one time, except in one late shipment. Twenty-eight cases were sold for $2.46 each, and realized at Grimsby net, after all expenses were off, $1.68 per case. These were specially selected peaches. I find I have not got here the exact weight of the peaches; perhaps Mr. Pettit can tell me.

Mr. PETTIT: I don't think I could tell you the weight. There were 64 peaches in each case.

Prof. ROBERTSON: The weight would be not more than 15 pounds of peaches?

Mr. PETTIT: Somewhere there.

Prof. ROBERTSON: The next lot of peaches, 30 cases, sold for $2.99 each, and netted at Grimsby $2.31 after all expenses and commission were taken off. Then 53 cases were sold at $1.46, and netted 92 cts. at Grimsby. I will read you an extract from only one letter in regard to that. This is from the consignee in Covent Garden: "You will notice the good prices we made of peaches"—that was that second lot. "We must say that whoever packed those did his work well. They arrived in splendid condition, and have of course met with good results. We think the Elberta peach is the finest, and ought to do well in this market." We have not had much success in a general way in shipping Crawford peaches yet. That shows there is an opportunity in England now for peaches—for small quantities—if put up in such a way as to be carried safely and to have an attractive appearance when they are delivered.

Then in regard to the trial shipments of pears. The returns from the pears vary very much, partly owing to the size of the pears and partly owing to the condition of the pears as to ripeness. Some pears were landed a little too ripe, "dozy"; and then later shipments of pears were landed too green. With some, we hit it just right. We had some that were landed just right, some that were landed too ripe, and some too green. Pears should be picked when the pips are about to turn brown. In the case of the very early and tender pears, they should be picked *just before the pips turn brown.* If the late pears are packed in that condition they don't ripen on the way, and when the English buyer cuts the pear down and looks at that part, if the pips are white, unless the pears are very fine he does not want them. If the pips are too brown he says they are going toward decay, and they go into the hands of the jobbers. A very early and tender pear should be picked at an earlier stage of ripeness than the later pears which don't ripen so quickly. We all know that as a principle, but we have forgotton to put it in practice in the actual management of the shipping business. Here are the figures of one of the early lots; 55 pkgs. pears from Mr. Woolverton were sold for 86.4 cts. and netted 50 cts. at Grimsby. The packages held about 16 or 18 pounds; the large ones a little more than that. The

report to me from Manchester was that that was the actual weight of the pears. 95 pkgs. from Mr. Van Duzer were sold at 93.7 cts. netting 52.6 cts.; and 145 pkgs., specially good, were sold in Manchester for $1.97 and netted in Grimsby $1.54 per case after all expenses were off.

Mr. PETTIT: What kind were those?

Mr. VAN DUZER: Bartletts.

Prof. ROBERTSON: The fruit shipped by J. D. McKinnon & Sons sold as follows: First lot, 74 pkgs., were sold at $1.07 in London, and netted 65 cts. in Grimsby; second lot, 77 pkgs., were sold at $1.21 in Manchester, and netted 82.2 cts. in Grimsby; third lot, 65 pkgs., were sold at $1.19 in Bristol, and netted 71.1 cts. in Grimsby; fourth lot, 60 pkgs., were sold at $1.23 in London, and netted 64.7 cts. in Grimsby; fifth lot, 11 pkgs., were sold at $1.90 in London, and netted $1.34 in Grimsby; sixth lot, 32 pkgs., were sold at $1.07 in London, and netted 64 cts. in Grimsby.

These differences seem inexplicable, but the correspondence and my reports from Grimsby and from our own agent in London, indicated that every time when the pears were superior in quality, in size, and just right in condition, they fetched extreme prices and there was a great demand for them; whereas when the pears were small in size or not in good condition they struck a poor market. If you read the correspondence you would see the reason for the extreme differences in price in the same markets for fruit from the same shippers. Here are the returns from A. H. Petvit & Son: First lot, 6 pkgs., were sold at $1.59 in London, and netted $1.14 in Grimsby; second lot, 5 pkgs., were sold at $1.22 in Manchester, and netted 83 cts. in Grimsby; third lot, 15 pkgs., were sold at $1.21 in Bristol, and netted 72.6 cts. in Grimsby; fourth lot, 80 pkgs., were sold at $1.14 in London, and netted 55.5 cts. in Grimsby; fifth lot, 242 pkgs., were sold at $1.97 in London, and netted $1.40 in Grimsby; sixth lot, 132 pkgs., were sold at $1.60 in London, and netted $1.14 in Grimsby. The larger the lots the better they sell. If I were to quote you all the large lots only I would give you the best prices in every market. I mean, an appreciable quantity will fetch higher prices than five or six cases of a sort. All you want at this meeting are instances giving general information.

I want to read a few letters in that connection. This is from the consignee in Covent Garden, London, in regard to the size of the pears:—" We notice that most of your fruit is small. Now small fruit on this market does not sell well. It must be large, bold, clear stuff. That is the reason of the success of California pears." Now, that is the same firm that sold pears of ours later on at good prices when we sent them what they wanted. " We think the size of pears you send should be no smaller than 60 or 62 in a case. When you get them up to 100 and 122 in a case, that is very small." I would like to read you one other brief reference from *The North of England Fruit Brokers, Limited*, of Manchester:—" The quality of those you sent was most excellent, especially the Clapp's Favorite, but there will have to be great improvement in the cold storage arrangements for transit, and much more care exercised to make the temperature suit the fruit, maintaining the same degree all through the voyage. If they could only be put in this market in the same condition in which they are put on your markets good business will be done." That is in regard to the first shipment. Later reports say even from their standpoint the cold storage was all right. The fault was not in the cold storage; it was in Montreal in this case, where the first shipment missed the steamer and then had to be held over for the next steamer. It was the holding of them that caused that over-ripeness. Then from W. N. White & Co., of Covent Garden:—' The Duchess pears have also done well. These hardy sorts of pears are sure to do well. There is not the same danger in shipping. As regards what you term French pears, there is no use sending them again here. They are what we call Bonne Terre and should come much later in the year. I

cut one in two and saw that the seeds had not turned black, showing that the seeds were not properly matured." Then also from the same firm :—" From experience we find that the pear is only fit for pulling when the seed is just turning black. If it is picked when the seed is white there is no keeping quality in the pear. Care must also be taken not to pick it over-ripe. The seed must be just on the turn." These are large handlers of Canadian and French and Californian fruit. One thing more from the same firm, enclosing a cheque for the proceeds :—" We have already cabled you the net results and also the prices realized for the Duchess pears. These did very well indeed, and large clear fruit will always do well. The Keiffer pears were also in good demand, but the peaches, with the exception of Elberta peach, are not much of a success. They seem to eat very harsh, and there is not much juice in them. The Elberta is much the better peach." Then a letter in reference to the last shipment :—" We have already written you our views on these pears, and think if next year regular supplies are kept up they will do well, especially the Duchess pears. The Keiffer pears will also do well on being better known." (Laughter). I am not offering you any casual opinion of my own ; I am offering you the judgment of the firm that has been sending us the money for that fruit—the exchange we want. Now if they are willing to exchange good English gold for Keiffer pears, let us give them enough to get a good exchange.

I have only a little to say about apples. We sent over altogether 1456 packages. They were all landed in good condition. Nearly all pleased well, but there was a common complaint that the packages were much too small. The Department was willing to let the shippers have their own way, and I also, with the shippers, was willing to make trial whether we could send fancy apples in small packages and make a good trade of it—I mean packages so small that they were about from 14 to 16 lbs. net of apples in each. We found these too small. They netted some fair prices considering the size ; but still they did not pay. Taking off the expenses, which were very heavy, these small packages netted anywhere from 5 or 6 cents up to 21 and 25 and 30 cents, which after all is a good price for 15 lbs. of apples. A forty or fifty pound case is the case that they want as a minimum for fancy apples. We sent some half bushel and some bushel cases. Here is one report :—" Apples. Speaking generally we beg to say that in our judgment these boxes are much too small for apples. We think apples should never be put at this time of the year in boxes containing less than 40 lbs. That is still a small package. For the last six weeks very large quantities of English eating apples have come in our market and been sold at an average of six shillings per hundred weight, which were quite as good a quality and better condition than the shipped ones. Our English apples have not the colour that yours have, but we are inclined to think that the expense of wrapping them in paper and putting them in small packages, as was done in this case, is at this time of year inadvisable." The same people wrote me later,—a letter which I received only yesterday. It is not confidential, therefore I use the names. " By the ss. Manchester Trader we received from Messrs. Pettit & Son, and Mr. Andrewes, of Grimsby, Ont., consignments of apples in boxes of about 45 to 50 lbs. gross. The quality and size were really good, and such will always command good prices. We have written Messrs. Pettit and Andrewes advising them to send all they can if they can ship the same quality and size, as we feel sure they will do well. We should be pleased if you would advise any of your shippers if they hold this A1 stock to ship it here, packed in 40 lbs. net boxes, and the apples wrapped in tissue paper. It is no use sending small or medium sized fruit, as there is plenty of this kind on the market." Those apples, looking down the sales, sold from seven shillings, and in fact one lot of seven cases as high as nine shillings—from nine shillings down to 4s. 9d. per case for everything except the samples. Those are substantial good prices for 40 lbs. of apples.

Mr. CASTON: What would they net at Grimsby?

Prof. ROBERTSON: At the same rate of expense as the shipments made by the Department, a package that size would cost about 40c. for transportation and selling expenses. The freight charges varied according to the rates that prevailed on the ocean, and also as to whether a full carload or not was sent. If they sold for 7 shillings with 40c. to come off, they would net about $1,28 per box.

Mr. CASTON: That is about a third of a barrel, that 40 lbs. of apples?

E. D. SMITH: A little less.

Prof. ROBERTSON: I should think those apples would net about $1.25 a box at Grimsby,—perhaps a little better. That particularly fancy apples in fancy cases will fetch a fine price goes without saying. I have a letter here from London dated November 22nd., and Mr. R. W. Sheppard is also in the hall and he will let me give away, I know, some of the information about his business that came to me through another channel. This is what happened. I wanted to have three cases of very fancy apples sent to some friends in London, and I did not get word of that until all our shipments from Grimsby had been sent forward and disposed of. I wrote our agent to get three cases of fancy apples in London as cheap as he could and as good as he could, and send them with the compliments of the Canadian friend to these people. He wrote me,—"Sheppard's consignment of Fameuse apples arrived only yesterday. I had three cases sent as directed. I have written to each of the parties to whom the fruit was sent. The fruit is very fine, and so is the price, which was 21 shillings per case, and 1s. 6d. each case for carriage. The apples are retailed at 1s. 8d. per dozen." That is quite a price. This letter says 21 shillings a case, and it is rather a favour to get them from one of the largest concerns in London, that has an almost unlimited demand. The case I suppose holds about a bushel.

Mr. SHEPPARD: A little more; 196 apples.

Prof. ROBERTSON: This same letter says:—"On last Monday I called on several large firms in Bristol and saw a lot of Canadian apples, and I felt ashamed of my country. They were slack, wet, not well graded, dishonestly packed, many barrels being topped with good fruit, filled with perfect rubbish of many varieties. I counted 25 varieties on the bill of lading to a consignment of about 100 barrels. Some of the barrels have more than one variety in. The Elder, Dempster people were offering Fameuse apples"—(those were Fameuse that we paid 21 shillings a box for)—"were offering Fameuse apples for six shillings a barrel, and could not get even that price—large barrels." Compare that with Sheppard's 21 shillings for the box holding a little over a bushel! Now I need not say anything further to emphasize the value of selection and quality and condition and packing and package for getting a big price and an almost unlimited demand.

Mr. President, I now put all these account sales and things to one side. I have not given you a great deal of detailed information. I have given you, perhaps, what is better; I have given you impressions as to what the conditions are and what the possibilities are in regard to tender fruits. Each man must work out the methods for himself in his own locality. I now pass on to mention further what I think are improvements required for and in the commerce in large fruits. First of all, for the export trade there must be comparatively large lots of one sort and of one variety—not too many varieties in a single consignment. Then there must be fine quality and fine condition. The apples, specially, must be large and uniform and sound. Nature does not provide them of that sort on the trees. They are not uniformly large, and they are not uniformly fine in appearance, and they are not uniformly sound; but it will pay the shipper to send to the English market only those that are, and do something else with the others. There would be more money come into the country by sending out only the uniformly good fruit. (Hear, hear.) The fruit must be fine in regard to

flavor, if we are to please and keep the trade permanently. There are one or two ways for the apple trade to gain that end. One of these is that the orchards shall be so large in their production that the individual grower can meet these conditions himself, by having reasonably large quantities of each good variety he ships. If the grower of the fruit be not in a position to do that, then there must be a central packing and shipping place for the locality. I don't see any other means of putting this trade on a basis that will make it profitable commercially. Our cheese trade, which is bragged of a good deal, and perhaps deservedly so, will bring in something over $19,000,000 this year. That is a reasonably large sum, and has grown from under $6,000,000 within my recollection and active connection with it. That has been possible only by the trade being on this basis: the production of uniform quality at the factories, and then the handling of that by competent commercial firms that select carefully and send only to each market what suits it. When Canadian cheese is quoted at a price, it is bought on this side and the money practically sent here for it; it is not consigned, as a rule. The possibility of that begins when the quality is of a standard sort, and is uniform throughout each lot; otherwise the men on the other side will not buy; they will compel consignments, and consignments of irregular, inferior goods spell ruin. Now, our butter trade is getting on as good a basis as our cheese trade. In 1894—that is not long ago—the exports of butter from Canada were worth about $600,000; and this year, because of more systematic manufacture and safe transportation, the exports will rise to probably $5,000,000. I think they will increase $2,000,000 further next year. That seemed impossible four years ago, when people said: "Oh, you have no business sense, or you would not talk of those possible increases." If you put the business on a safe commercial basis in regard to the production and the selection, and the handling and transportation, the English market will give you any amount of money for the right quality of food products. I mean they have the market and they have the money. I merely instance what has been achieved in those two products by these methods.

The transportation on the ocean has not been of the best yet for either apples or tender fruits. It has been gradually getting better than it was. And now for the tender fruits. This is in contemplation for the next season: Instead of having large cold storage chambers—which were all we were able to provide for three years ago, because the steamship owners then would hardly do anything, thinking the business was not worth encouraging—we will be able to arrange for small cold storage chambers of from one to four carload sizes, so that tender fruits can go in a chamber by themselves and be treated as they ought to be, instead of going in as a side accommodation in a butter chamber. But we could not get as far on as that until this year. Now the Minister of Agriculture has arranged for small cold storage chambers on the ships, in which the temperature can be kept from freezing point or below freezing point up to any temperature required. The steamship companies say they will provide ventilated holds for apples. But providing these facilities does not ensure that the fruit will get the benefit of them; and there's the rub. There is no blinking that. I listened last year with a good deal of interest to the discussion which resulted in the appointment of a Transportation Committee of this Association. There are cold storage cars on the railways, and there is plenty of ice in the ice-houses along the lines, and there are cold storage chambers on steamships; but these things don't act themselves—(laughter); they don't bring about anything. All the Government can do, I think, in the matter, in the commerce of things, is to help to provide the facilities, and then the man who has the stuff in his care and at his risk may put the agencies into operation. Take the cold storage in railway cars for butter. It took three years to educate everybody—the railway agents and the men in Montreal, and other men. Cold storage is a business that requires trained men to mind all the

little things about it. And now the individual fruit grower must look after his own fruit as long as he has any risk in it, no matter what conveniences or facilities the Government provides, because the carelessness of those who handle it may prevent the facilities from being useful to the man who ships.

The unfortunate position of the apple trade is due to one of two causes, and even to both causes combined—not only bad transportation and not only bad packing, but sometimes bad packing and poor transportation combined to do the greatest possible damage to the business. One of the main causes of loss, however, is the want of skill in packing apples. I suppose everybody is born with ability to do a great many goods things. I know most men are born with a consciousness that they are able to judge horses and make good speeches and run for parliament—(laughter)—only sometimes they don't get the chance. I hope no fruit grower will believe that he is born with the ability to pack apples by intuition. It is a business that needs particular painstaking in the learning. I don't know yet how to pack apples. I have not packed many barrels myself—perhaps 20 or 30 with my own hands—but I have supervised the packing of a great many more, and I don't know how to pack apples. I don't how to make horse shoes ; I don't how to make doors. I haven't learned the business. Do you see? I want to lay down the proposition that a man doesn't know how to pack apples until he has learned the business of packing apples. You don't know it by intuition. You have to begin by learning a little, and then adding to the experience a little more, until you know how to pack apples. By that process we would have a lot of trained men and women and boys able to pack apples. Then there has been great want of care, as well as lack of skill. Then there has been want of honesty. That ugly word dishonesty will somehow thrust itself in before the man who is examining our apple trade. He says to himself, " I mustn't say that because I will offend a great many Canadians." I was told when I went before the Committee of the House of Commons a few years ago, " You mustn't say anything reflecting on the honesty of the fruit growers and farmers, because everybody will be down on you." That doesn't make any difference ; because much as I strove against having any such opinion, the evidence would keep coming up and keep coming up in the most irrepressible way that there is, somewhere and somehow and very often, simple dishonesty in the packing of the fruit. I cannot put it in clearer English, and I can't put it any stronger than by saying these few words. Is there any proof ? I told you what we did last year. I would not even try to thrust the proof on the Convention if it was not in the hope of making some amendment. I think the most graceless and useless undertaking in the world is to go about finding fault unless one is finding fault on purpose, and with some ability, to make remedies.

Last year we had a great many fruit growers saying that the damage to apples was all done on the railways or on the steamships or in the markets of Britain ; and nobody seemed to know where the damage did take place. Last summer the Minister of Agriculture authorized me to engage two men to watch the condition of the apples, passing through the ports of Montreal and St. John, N.B., and Halifax, N.S. These men were not official inspectors—I mean they were not clothed with power to seize fruit—but they were Government employees to stay on the wharf and watch the loading of fruit in the ships, with instructions to pick out here and there average sample lots, examine some barrels and make me a report of what they found, with the name of the shipper and name of the consignee, with the number of barrels and the car numbers: Some of these particulars I am not going to give to this Convention. They were confidential to me as an officer of the Department.

The reports of the inspector at Montreal began on the 6th, September. He picked out carload lots and the following are extracts from his report on several lots. "Damp, and some barrels wet." That was in Montreal. Then on the

same day: "A good many No. 2 apples in this lot." That was another lot. Then on the same day, "Brand XXX 100" —I don't know if anybody here knows the brand—"some of the apples were very small." That is his report. Of course he found other lots: "Apples in good order and the weather cool." These were examined in Montreal before there was any chance of being damaged on the ship. In another report he wrote, "This lot is in good order, certainly small, but sound." And then, "packed loose." Then another lot, "badly spotted." Another lot, "badly spotted." Next, "loose packed." Then, "A. No. 1 fruit." Then the next lot, "Apples rotten and loose packed". Then the next lot, "Some poor and slack and loose packed." Next lot, "Fruit only fair." Next lot, "Fruit some spotted." Next lot, "Fruit A No. 1." Next lot, "Fruit A. No. 1 but small,"—and so on. I am giving you quotations from the reports on the lots that went on five steamships in those three days. I can do that now without any hesitation, because those apples have all been sold in England. These were apples shipped in September. Sept. 21, "Apples A. No. 1 in good barrels." Sept. 22, "Lot Blemheim Pippins rotten.' Sept. 22, "A. No. 1, but fruit seemed a little on the small side." Sept. 26, "Fruit A. No. 1, barrels very poor." Sept. 27, "Rotten fruit in good barrels." Oct. 2, "Fruit A. No. 1, barrels very poor." A No. 1, good barrels and well packed." Oct. 4, "Apples, fruit small and spotted." "Fruit poor and bad barrels." "Fruit A No. 1, poor barrels." "Fruit rotten and poor." "Fruit only fair." "Fruit, Pippins A No. 1; Snows poor." Each one of these refers to a different carload. Oct. 9. "Fruit only fair." Oct. 10, "A No. 1 but small." "Fruit small but branded No. 2." "Fruit spotted and poor, also small." "A No. 1 fruit in poor barrels." "Badly spotted." "Badly spotted." "A No. 1 but small." "Next lot small but A No. 1." Oct. 16, "Rotten and others fair." "Fruit some spotted." "Fruit rotten, others fair." "Fruit rotten and wormy." "Fruit only fair." "Fruit only medium." "Fruit A No. 1 but too tightly packed." "Fruit No. 1 but barrels wet." "Fruit badly rotten." I am reading some of the worst ones.

E. D. SMITH: You are taking them as they run?

Prof. ROBERTSON: No, I am taking perhaps six out of twenty.

G. Y. Smith: Does it tell the kind of apples?

Prof. ROBERTSON: Yes. I am reading you the reports on from one quarter to one sixth of the whole number of carloads examined.

E. D. Smith: Taken indiscrimately?

Prof. ROBERTSON: Taking more of the poor ones. The inspector had no official power to disturb the fruit very much, so he did not disturb the barrels very much. He took a few apples off the barrel and looked down in them. Then, Oct. 23, I will read you the comment on each lot in this report straight through:—"Fruit all No. 1." "Fruit only medium." "Fruit A No. 1, good barrels." "Fruit A No. 1." "Fruit poor and rotten." "Fruit A No. 1." "Fruit very poor." "Fruit A No. 1, good barrels." "Fruit very poor." "Fruit poor stuff." "Fruit rotten trash." "Fruit A1." "Fruit A 1." "Fruit fair." "Fruit poor and bad barrels," "Fruit only fair." Fruit A No. 1, good barrels." That is the summary of all the carloads reported on that one sheet.

I will read you only two extracts from the inspector at St. John, N. B., and Halifax, N. S.:—"The ventilation in most of the ships might be fairly good if only such care in looking after it could be secured as most people give to the preservation of their own property. Extreme roughness in the barrels, received in the unloading from the cars as well as in the stowing of the ships, cannot fail to injure the fruit—(Hear, hear)—and it seems to me under present conditions very difficult to control. In St. John the apples are unloaded from the schooners alongside the steamer, and fare rather better in that respect than in Halifax, where they are unloaded from cars and then rolled through the freight shed that in wet weather is often very dirty, and the barrels get blacked up very much. This, however, is easily remedied, but certainly somebody should have more

control of the rascals that smash and tumble the barrels at their sweet wills." (Hear, hear). "Then the loading ot those steamers is done mostly at night off the railway. Barrels are rolled across the warehouse and loaded into the steamers outside. It is quite impossible in this rush to catch anything from the marks on the barrels." There is what you find, reported from intelligent, competent men, examining the fruit at our own ports before it leaves.

Now, it is not surprising that bad reports and bad sales come back from at least that class of fruit; and I have not picked on, and they did not pick on, any particular lots, but spent their time during September and October examining different lots—giving me a full report like that every week. There is something radically wrong, to allow so much waste and so very great loss, to go on in an important business like this.

I want to say a little now as to what the agent we had found on the English side. He also was an independent man, outside of commerce. This is in regard to apples. "Sept. 2,—A lot of Nova Scotia apples were sold to-day at from 15 to 17 shillings per bbl. and that in a market glutted with English apples of all kinds, including windfalls. I noticed barrels with a thick paper at each end, as I suggested in my report to you last spring. I noticed the barrels opened up with a much handsomer appearance than barrels without paper, which had a bruised, and in some cases a dark bruised appearance. Neglect of that little point caused shippers a loss of one shilling a barrel. The best Nova Scotian apples are far better than the Ontario boxed apples in every way." Nova Scotia apples are not sold as Canadian apples. As I pointed out to the Convention last year, in examining account sales the percentage of wasty and slacks in Nova Scotia apples was about six per cent., and the percentage in Ontario and Quebec —so-called Canadian apples—was something over sixty per cent.

A. H. PETTIT: What about the Nova Scotian barrel and the Ontario barrel, in the bilge?

Prof. ROBERTSON: They say the difference in the bilge of the barrel now is so slight that that cannot contribute much to the difference in the condition of the fruit.

Mr. CASTON: The Nova Scotia people are half way there; that is an advantage.

Prof. ROBERTSON: They have some advantage, and still they complain of the handling at St. John and Halifax, the rough handling; but the Nova Scotia orchards perhaps each produce a larger quantity of one variety than in Ontario. That is very important; and the Nova Scotia apples are nearly all handled by men trained to the apple business. Many of the London firms now have their own men and warehouses in Nova Scotia, and those that are not handled in that way are handled by large growers and men trained in the packing. These account for a great deal. I was speaking with a Nova Scotian grower the other day who for three successive years has done his own shipping from his own orchard, and his apples have averaged him in his orchard over $3.05 net per barrel, for three years' shipping.

DELEGATE: What kind of apples were they?

Prof. ROBERTSON: He has a good many Baldwins and Kings. He sprays five times a year, so that there are no spots. Two years ago he said he was astounded to find one man putting in small apples in a barrel—as the man thought, to help him out. He dismissed the man on the spot and gave him a dollar to go. That was told all around among his packers, and he says he has not had to dismiss a man since then.

This is from a report dated November 22.—"Nova Scotia fruit is well spoken of this current year, but the general opinion regarding Canadian apples" —(Ontario and Quebec Provinces)—"is that they are worse this year than ever. I am looking into the matter, and will report to you later. . . . I saw a few

barrels Canada Baldwins well graded and nicely packed, but they were very wet. I should judge the wet is caused by the barrels being stowed in heated holds without ventilation. I have not heard complaints *re* Nova Scotia apples being wet or slack. The manager of the fruit department of the Army and Navy stores told me this morning that Nova Scotia apples were very good, but Canadian apples were most unsatisfactory in every way, and worse even than last year." That is an unbiassed report, and it is along the line of the report from Montreal before the apples were on the ocean at all. So it does not seem to me that the blame lies on the ocean transportation for the poor apples and the low prices.

Mr. CASTON: But there are a great many apples this year arriving in that condition that are well packed, owing to climatic conditions that were unusual.

Prof. ROBERTSON: I have one more letter. This is from Liverpool. The agent of the Department goes to Bristol and stays a week, and then goes to London, and then goes to Liverpool and stays a week, and looks for himself, and finds what he can learn. This is what he says: "I called on Woodall & Co., Temple Court, Liverpool, *re Canadian apples* and they complain very much about the quality and condition; they sold a lot of Ontario apples for 1/9 per bbl. (gross) this week, (slack and wet). They find no fault with the shape of the barrel (bent staves) and prefer it to the Nova Scotia barrel. They account for the large number of slacks to the jolting on freight trains in Canada. The quality of apples they say is not so good this year, they are more liable to sweat and become soft, than usual. I asked them to send you catalogues of their fruit sales which they will do."

You see something of the condition of the apple trade. You knew it before I said anything. I have not come to give you information that is new to you all, but I have put it in the light of reliable and official reports received on this year's business.

I speak now with a good deal more diffidence, because this is a business with which you are more intimate and of which you are certainly better able to judge than I. I suggest this to your very serious consideration: Should there not be an application of some official, recognized standard for apples packed for export? Should not the standard first of all include some designation that the size of apples in a barrel are not less than so and so in inches? Should there not be some standard of size, so that a purchaser buying a certain grade may expect that the apples in the barrel will be all up to specified size? Then should there not be some definite standard of quality in regard to soundness, to shape, and to freedom from blemishes? And then should there not be some standard of variety? I mean some enactment providing that only certain apples could be legally called Kings and Baldwins and Northern Spys, and that no other sort of apple could be legally called by those names. I would like you to think that out. Don't we need standards for these three things? I don't mean that we should make the branding of them compulsory. Should we not have some reliable measuring guage for a barrel or other package of apples and pears? You could not do business if you said only to a man, "I will sell you a box of cheese at so much per box." It might be a big box or a small box. We need a standard for size and quality and variety.

Then let me make another suggestion. Do we not in Canada need some enactment that will require the branding of the name of the grower and the name of the packer on every closed package of fruit for export? (Hear, hear). Should we not require that? You say, "What business is it to the Government that a man should put his name on?" Well, the Government is a form of co-operation of all the people to make this a desirable country to live in: and if it becomes more desirable to do business in by having this done, and no individual's liberty suffers injustice, why not do it? If a man brands the names, John Brown, grower, William Smith, packer," on the package, and if he brands it, "A

No. 1 "—if that be the standard for size or quality—or if he brands it " Northern Spy " and any inspector in Montreal or any other port finds a barrel of apples of John Brown's or William Smith's with something else than Northern Spy in it, and something that does not come up to the standard represented by the brand, then let that barrel and all similar barrels be taken at once and sold for what they will fetch, and the returns put in the hands of a committee of fruit growers to suppress fraud in Canada. (Laughter).

DELEGATE: Why do you wish the grower's name? He picks the apples and lays them under the tree. I don't see why his name should appear.

Prof. ROBERTSON: The object in putting the grower's name would be this: As far as he supplied good fruit he would get the benefit, from his own name being on the package; if he had bad fruit he is not liable to a penalty, but the putting on of his own name, if the fruit was condemned would be a means of keeping him from selling to a packer who would dishonestly pack the next year. If you had not both names you could not trace the fruit so well. The grower is under no penalty in any case, unless he is also the packer.

DELEGATE: There is some poor fruit in every orchard, and if a packer takes them all and packs them I don't see why the responsibility should be on the grower.

Prof. ROBERTSON: If the grower lets the poor fruit go off his place mixed with the good he can't object to the buyer doing the best he can with what he buys; and that is what is ' playing hob ' with the business. I am making only a suggestion, not even recommending this to you. You can discuss it. If a grower sells his orchard to a packer he is nevertheless the man who is most interested in the trade next year and during future years. Now, his name appearing on the barrel would not make him liable for anything, but it would make it possible to trace the fruit back and send him word that some fruit with his name on it was found badly packed and found so as to do the fruit trade of the country harm. It is for you to discuss these things. I suggest that the standard should include a designation for size, should include a description of quality, and should include a statement of the variety; and then I would suggest in the next place that there should be compulsory legislation, that the grower's name and the packer's name should appear as such grower and packer on every package of fruit intended for export. Other countries do that now in regard to some other things, and they find it exceedingly useful—for instance, New Zealand in regard to butter, and other countries in other things. And then, in the third place, the suggestion as to whether it is not desirable to impose some penalty. Now I said " confiscate." My notes, which I thought out more carefully, do not say confiscate. But as to whether there should be some penalty imposed on any one having fruit bearing false brands, and if so, what the penalty should be. I suggest these three things to the Convention as being needed to put the commerce in large fruits on an honest and safe and profitable basis. I believe that the adoption of these suggestions would help in that direction; and I thank you for your patient hearing. (Applause.)

THE PRESIDENT: I think we are on the right road to get at these difficulties in some way that we will be able to deal with them. It certainly is coming before us so very plainly, and the fact that so much of this fruit is in such bad condition at Montreal, Halifax and St. John is somewhat of a surprise. The idea that the fruit leaving this country would be in that condition at the port before shipping is something remarkable. It becomes more and more apparent that the fruit is fraudulently packed. These baskets that we have here, and these reports that we have, all confirm this. Now we will be pleasad to have any discussion of the matter. I am sure Prof. Robertson will be pleased to answer any questions that you may ask.

Mr. REID (Belleville): If I were a grower I would have no objection to my

name appearing on a barrel; but Prof. Robertson says the packer's name should appear. Now if the packer means the shipper, I think it would be all right; but if the packer is merely the packer working only as a packer, not the exporter, I do not think his name should appear.

Prof. ROBERTSON: By the word packer I did not imply the name of the workman who packed, but the name of his superior who owned the fruit. The owner who is responsible is the man I was after.

Mr. REID: The shipper.

Prof. ROBERTSON: He may or may not be. William Smith may grow, John Brown may buy, but John Brown may sell to a Montreal exporter. I want the names of the two men who are responsible for the condition in the barrel. Of course the buyer is the man I want—not necessarily the exporter, because the buyer might sell to an exporter.

A MEMBER: The man who is selling must sell to the highest buyer. He does not care for his name on the package; he wants the most money for his orchard. How is he to get over it?

Prof. ROBERTSON: If a man has an orchard yielding him 200 barrels it is to his interest to get the largest price he can for those 200 barrels; but it is far more to his interest that there should be a demand for future crops from his orchard, and that he should not sell to a man who would get his orchard a bad name or get the country a bad name. So that if a man this year sells for $2 to a man who would handle it at a profit, he will get that $3.50 by and bye. So the grower makes a huge blunder if he sells for a high price one year to a man who damages the fruit trade. That is why I want to see that the growers are interested even more than the shippers; because if it were not for this bad fruit we would have got into Canada this year at least—how much do you suppose? Well, I think a million and a quarter dollars more for the same barrels of fruit, as near as I can figure (Hear, hear), more than we have got now. Now, that million and a quarter dollar loss has done nobody good. Now, if we can get a million dollars some way, the farmers would get their share of it, and the railways and the steamships would get a share of it.

Mr. POWELL: The position which Prof. Robertson has given of the apples in your country is very much the same in my own. I have listened with a great deal of interest to the presentation of this question, and I must say that Canada is not an exception in this matter of large quantities of defective fruits sent upon her markets; and I have been extremely interested in this special investigation, which it seems to me is going at the root of this matter. (Hear, hear). What Canada is doing in this direction is going to benefit our entire country; and I want to express to-day in this association my great satisfaction in knowing that you here in Canada are taking a forward step to correct this condition of things, which certainly is a calamity for both your country and the United States. (Applause). There is no question that the consumption of apples can be increased in foreign markets 100 per cent. if we will only send our fruit there in a better condition. There is one point which I would make here, and this I think I made yesterday—we have to begin in the orchards for this better quality. We have got to begin right at home, and we must produce the least inferior fruit there. If inferior fruit in grown in the orchard it will find its place somewhere in the market; and so long as that exists, so long we are going to find difficulty and trouble in the marketing of our fruits. And so the whole question of culture comes up again; the whole question of fertilizing the soil; the whole question of properly pruning trees that may make it possible to produce a very fine quality of fruit in our orchards. The question of spraying enforces itself upon us here with renewed importance after listening to the this very able report. We must begin at the orchard and eliminate there as far as possible inferior quality. I I want to say I heartily endorse your action in this Association and in your

Dominion in taking these practical steps toward removing this great trouble of putting upon the English and foreign markets so much of poor fruit. One other point, and that is the local market. As Prof. Robertson has said here so truthfully this morning, we should grow finer fruits for our home consumption. The Keiffer pear is good to export for the reasons which Prof. Robertson has stated. The Ben Davis apple has good shipping quality, and it is liked for that purpose. But for home consumption we should aim to produce fruits that have finer eating qualities than either of those fruits which I have mentioned, and and there are any number of consumers who will purchase fine high-flavored apples and high-flavored pears if they can only receive these fruits in clean, sound, good condition for their own use. And so we have a good deal to learn in relation to the methods of handling and growing these fine fruits for home consumption. As the consumption of apples can be increased 100 per cent. in foreign markets, it is equally true that the consumption of finer-grown fruits can be increased 100 per cent. right here at home, and that that being done the solution of profitable orcharding is right here at our own doors. (Applause.)

A. H. PETTIT: Do I understand Prof. Robertson to say that if his suggestions be adopted it would mean an inspector or inspectors of all apples being shipped from this country?

Prof. ROBERTSON: I have no authority to speak for the Government in regard to appointing inspectors.

A. H. PETTIT: How would we arrive at it without?

Prof. ROBERTSON: Ask and ye shall receive, I suppose. (Laughter.)

Geo. E. FISHER: I understand that you suggest that the shipper may put up any sized fruit that he chooses, but that his package must state the minimum size of the contents?

Prof. ROBERTSON: Yes.

Mr. FISHER: In my experience in shipping fruit I find that a great deal depends on the condition in which the fruit is picked. This is a feature of fruit handling that has been entirely overlooked down to the present stage of this discussion. I believe there is a right time to pick the fruit, and that the grower should have his eye on the fruit continually. He should pick his fruit in this particular stage, and he should cool it and ship it without delay, and where this is done I think there will be very few "slacks" and "wets" on the other side; and I believe that the practice of allowing fruit to remain on the tree until it suits the convenience of the grower to pick it, and then putting it on the ground and leaving it there until it suits the convenience of the packer to pack it. is responsible for the slacks and wets to a greater degree than any other cause.

The SECRETARY: I would like to call attention to the fact that we have with us some representatives of the Montreal Horticultural Society—Mr. Shepherd and Mr. Dunlop, and also the President of that Society. I think they should feel free to address the meeting or to speak to the subject before us. (Applause).

The PRESIDENT: We will be very pleased to hear from any of these gentlemen.

Mr. R. W. SHEPHERD, of Montreal: I am really quite unprepared to say very much, but this question of packing and grading of fruit is most interesting. Now it appears to me that the system of packing in Ontario is wrong as compared with the system in Nova Scotia. As I understand it, in the majority of cases in Nova Scotia the growers are the shippers. Of course if the grower is the shipper he will see that he will he gets No. 1 apples in the No. 1 barrels, and he will ship accordingly; and No. 2 apples will be branded No. 2? In Ontario, as I understand it, the general practice is for the grower to sell to some packer who is in the habit of buying the entire orchard and packing them to suit his own convenience. Well, it seems to me that that is the beginning of the mistake. If the grower could be educated to pack up No. 1 apples and sell them to the buyers

who will export, then I think you will get No. 1 apples shipped to the other side. Otherwise, if you are going to leave it to speculators, you will never get over this difficulty. In the Province of Quebec, of course, we do not have such large areas of apples grown, and the orchardist in the Province of Quebec, as a rule—men like Mr. Newman our President, and others—pack up their own apples and ship them, and they know what they are doing, and as a rule I think they find it is very profitable—more profitable in the long run than the system that is adopted in Ontario. Our principal apple is the Fameuse, or the Snow apple, the McIntosh Red and the Wealthy and Duchess. These are our leading commercial apples. The Duchess we find difficult to sell, but we in the Montreal district have been shipping the Duchess to Liverpool and Glasgow, picking them before they are ripe and selling them as cooking apples. We find that they fetch better prices that way than selling on the Montreal market to compete at that particular season with the California fruits. No. 1 Fameuse, packed in a proper way, will bring a No. 1 price, and we have no difficulty in selling No. 1 Fameuse. It is the most profitable apple we grow; and in the same way with Wealthy and McIntosh Red or any red apples. My experience is that red apples are the apples to grow for the English market, and if we put them over there in good condition we are sure to get a good price. (Applause.)

Mr. Newman, (President of the Montreal Horticultural Society) said: I have been very much interested in this discussion over the packing, and I think such steps should be taken as Prof. Robertson has suggested outside, so that it would be advertised throughout the country, and a man has a guage to work by when he is packing a barrel. I have had some experience with the storage of apples, and I think your losses this year have arisen very much in the same way as losses that have occurred to me. I have stored these very sensitive fall apples in cold storage in Montreal, different cold storages there, and outside of the temperature I have become convinced that the condition of the atmosphere is quite as important as the low temperature. I have had apples decay quite as rapidly as the cold storage, or almost as rapidly, on account of the dampness, as in a much higher temperature with a dry atmosphere. The apples being picked and often left in the orchard several days at a warm time, perhaps the air holding moisture at the time of picking, there is a ripening going on which develops more moisture, and even if those barrels are put in cold storage there is so much moisture in the barrel that they are in a very damp condition, and unless the air is very highly absorbent of moisture there will be so much moisture on the skin of the apple that rotting will take place very quickly. Now, the storages at present in Montreal are none of them, I think, of a dry nature. There is the pipe system, and granting that you would have the same air with the pipes—the pipes would absorb perhaps the contents in ice of the moisture in the air—but the doors being open so much, the air being changed continually, practically the chambers there are saturated; water is on the floor in a great many, and there is no drying power at all. I noticed this especially with my fruit last season, and whereas I have kept them in a chamber that happened to be dry other years until May, last season in the latter part of January we had to take them out on account of ripeness. There is another system started now called the dry air system, or the cold air system, and although that is rather surer to be dry I do not think it has any absorbing power. So if you were to ship from here a barrel that had been packed say the week before it got there, and the apples had considerable moisture on the skin, I do not think the apples would dry. The air is dry itself. It is chilled to about ten degrees lower temperature than the room. It rises that much, but in the chilling chamber I think it is fully saturated with moisture. It has just the drying power that the ten degrees of rise would give it, and I see going on there now re-packing of Greenings and Northern Spys and shipping to England. A great many of the Northern Spys are about half gone, and the

Greenings are a considerable loss, and I do not see how they will be any credit even when re-packed, going over; a great many of them, when you take them up, will quite damp and greasy on the outside, and they have been there a considerable time. I should think if the skin was dry they would be in a very much better condition, although I dare say the damage was done before they reached the storage.

Mr. DUNLOP: I appreciate very much the address of Prof. Robertson. I would revert to only two points. I think the discussion has tended to show that a great deal of trouble has arisen from negligence in packing the fruit. But I think the chief point raised was that we grow altogether too much bad fruit; and if we can improve the fruit by higher feeding of our orchard, by proper pruning in trees, and by proper thinning of our fruit, this thing will gradually cease and we will have a greater proportion of good fruit and as a consequence take care in shipping it.

Mr. CASTON: How many tiers deep do they pile these barrels in vessels?

Prof. ROBERTSON: It depends on the ships. Very few ships can take more than four tiers, or about seven feet. A few ships have what they call bunk holes. and in these they pile deeper. In other ships they carry them in what they call the oar loft, about 7½ feet deep. In reference to forming standards, after thinking the thing over a good deal my own preference would be this: for a standard specifying the sizes, not for the variety, but just 2, 2¼ and 2½ inches, and then allow 10 per cent only of the contents to be under that size; and then No. 1 would indicate the good quality, No 2, No. 3, and then for anything special say Extra No. 1. I mean we must use terms that are easily understood in commerce. Then if you have size 2½ inches, No. 1 Northern Spys, or size 2 inches A No. 1 Snows, you get three things all indicated in the very simplest terms, because if you say "A No. 1 Snows" which indicate one size, and "A No. 1 Kings" which indicate another size, you would get confusion. Let us stick to the size in inches; that is easily got at, and then to the quality, No. 1 or No. 2, and then A No. 1 for extra good. Now let us take action, and see if something further is not done, because when I go back to Ottawa I am busy with cold storage, and the Minister is busy with other matters, and then another year goes by and there is no progress.

Messrs. G. E. Fisher, A. H. Pettit, W. H. Bunting, G. C. Caston, T. H. P. Carpenter, M. Pettit, and E. D. Smith were appointed a committee to deal with the matter.

The SECRETARY read the following resolution, which was carried amid applause.: "That this Fruit Growers Association hereby tenders to Mr. Geo. T. Powell, of Ghent, N.Y., their high appreciation of his very able and admirable addresses and kindly assistance during the present sessions of the Association."

The PRESIDENT: I have great pleasure, Mr. Powell, in tendering you the very hearty thanks of this Association for the excellent service you have rendered us. I am sure we have been very much instructed from your addresses. We hope at some future time to have the pleasure of having you with us again.

Prof. ROBERTSON: If that resolution had not been put quite so promptly I wanted to say just one word. Many years ago, when the Farmers' Institute system of Ontario was quite young, full of promise, but with very little history of a good kind behind it, some of us had the good chance of going to New York State and seeing what excellent work was done by the Farmers' Institutes of that State. Now, Mr. Powell was one of the foremost men in New York State in giving the Farmers' Institutes in that State the most practical and useful turn, and we in Ontario have since those days reaped a great deal of information and inspiration and enthusiasm through our Farmers' Institutes, the beginnings of which, in some parts at least, were in the State of New York under the care of Mr. Powell, who is here to-day. (Applause)

Mr. Powell: It has certainly given me great pleasure to meet with you at this time, because I recognize that we have a common interest, that the prosperity which may come to you from all this line of educational work, through your Association, through your Farmers' Institutes, through your Department of Agriculture—whatever good comes to you is not confined to you, but extends beyond your borders and to us also. And so it is always a pleasure to meet bodies of men who are working earnestly to improve the conditions that are surrounding them; and it has certainly given me very great pleasure to be able to meet with you at this time, to take in your deliberations; and I want to say that if I have given you anything that has been helpful to you, that I have gained more myself in the short time that it has been my privilege to spend with you. (Applause).

REPORT ON SAN JOSE SCALE.

By Murray Pettit, Winona.

In February, 1898, a commissioner was appointed with instructions to make an examination of all fruit trees which had been planted five years and less in the counties of Halton, Wentworth, Welland, Lincoln, Lambton, Essex, Kent and Elgin, and to spend no time on trees planted in 1898, as these had been previously examined in the nursery. It was subsequently learned that the scale had been in the country at least seven years at that time. It was also found that the scale had been widely distributed in Ontario on nursery stock planted in the spring of 1898. No one can be blamed for these mistakes, as they were acting under the best information available at the time.

When it was found that the scale had been distributed on the nursery stock planted in the spring of 1898, Mr. Fisher was instructed to get a list of the sales from the infected nurseries and follow these trees to the limits of Ontario and examine them where they had been planted, which included nearly every county in the Province of Ontario. They succeeded in locating the scale in 100 places and destroying the trees. These 100 places were re-examined last spring, when the scale was found in only 13 of them, and again this fall when the scale was only found in 10. These have all been destroyed except in four, where the owners so far have declined to take them out. Now, when you consider 100 places being infested by the nursery stock sent out in one season, how important it is that all nursery stock should be thoroughly inspected and fumigated.

Mr. Fisher was then instructed to make careful examination of the nurseries and have the work completed before digging commenced. Last spring the work was started on the 12th of January with 20 men, and on the 20th of March 104 nurseries had been examined. The scale was found in five of them and has since been located in two more. The next order was to examine those orchards in which the scale had been found in 1898 and those to which it might have spread, locate all infested trees and have them destroyed before breeding commenced. These trees were located. While this work was being done the minister was waited upon by deputations of fruit-growers from Niagara and Essex protesting against the carrying out of the provisions of the Act. In some instances the fruit-growers' themselves made attempts to prevent the inspectors from carrying on the work. The minister was obliged by the force of public opinion to desist, and suggest a commission. Compulsory destruction of infested trees were discontinued and the scale has multiplied and spread so rapidly that now the conditions are entirely changed from what they were a year ago. It is a most important question for this association and the fruit-growers of this province to consider what should be done.

I beg leave to move the following resolution:

"The fruit-growers of Ontario desire to express their great satisfaction with the efforts made by the Ontario Department of Agriculture to destroy that most serious enemy of the fruit-grower, the San Jose scale. They regret exceedingly that any suspension of the working of the Act should have taken place, thus allowing the pest to spread with great rapidity.

"In view of the uncertain results of the work of experiment stations in the United States in the treatment of orchard trees with whale oil soap for the destruction of the scale, we recommend,

"That there be no relaxation of the inspection of orchards or of the destruction of infested trees, but that the work proceed with all vigor, while it is possible to prevent the spread of the pest.

"That in case of valuable orchard trees only slightly infested, the owner have the choice of having his trees destroyed, with compensation, or of having them treated for a certain length of time for the destruction of the insect.

"That the owner of an infested orchard, who wishes to have exposed trees treated instead of destroyed be required to thoroughly prune the orchard trees exposed in such a manner as may be required by the inspector, as a preparation for the spraying.

"That all nursery stock be thoroughly fumigated with cyanide of potassium gas under the eye of an inspector before it is allowed to be sent out."

Mr. HAROLD JONES: I have listened with interest to Mr. Pettit's report, and as representative from the eastern end of the Province I take pleasure in seconding the motion.

The SECRETARY: I think that the only question that would require any discussion at all would be whether any larger or greater freedom be allowed to individual orchardists to treat their trees than is allowed in this resolution. The only case that the resolution permits for the owner to treat his trees is where the trees are not plainly infested, but only supposed to be infested with the San Jose scale. Now, I am inclined to think that there might be a little greater liberty allowed, so that where any orchardist was willing to undertake to treat his trees under the inspector's directions, he might do so and not forfeit anything thereby. There is no danger of scale spreading from the tree while it is being properly treated, so there would be no harm to anybody but himself if the grower was successful in the treatment, and it would not prevent those trees being destroyed later if the treatment was unsuccessful. I believe it would meet the wishes of a large number of growers who are fighting vigorously against the Act if the option were allowed them of having them treated under the inspector, even if they have to go to a portion of the expense of having them so treated. That is the only portion of that resolution, it appears to me, might be modified to a certain extent. I believe otherwise that that resolution ought to have the hearty endorsation of this Association in order that the Provincial Minister of Agriculture might feel free to act in accordance with the wishes of this Association.

Mr. ROBERT THOMPSON (St. Catharines): I understand that the resolution makes no provision for the owner if he has a valuable orchard slightly infested and wishes to save that orchard, if it were possible to go on and do that under proper supervision.

The PRESIDENT: No, no provision for that. That is what is suggested to make that provision.

Mr. THOMPSON: I think from our experience in the south, in Niagara District, that unless some provision of that kind be made you will have terrible opposition to the Act like what we have had in the past—possibly such opposition as would hinder the working out of the Act as it has been hindered in this past season, allowing the terrible spread of this insect pest. I think it would be wiser, especially from some of the reports that we have received from other places, from some of the States in the south, that in sections like that around Niagara town, or up in the west in Kent, where there are large areas of two or three miles that are badly infested, where it would involve a large amount of money to pay for these trees, possibly a larger amount of money than the country would be willing to grant, an arrangement should be made for treatment which, if it would not eradicate the pest, would keep it in check. From my experience I believe wherever there is a small infestation the trees should be taken out at once without a day's delay, or a minute's delay, in the summer; but where there are larg

infestations the opposition has been so strong, and there is such a large number of trees in the area, running up into the hundreds of thousands, that it should be modified a little.

The SECRETARY: My amendment would be this, to change the clause to read, "that in case of valuable orchard trees only slightly infested the owner have the choice," and that the latter clause be cut out which says, "and in case of failure, of having them destroyed without compensation." Unless the mover of the resolution would make that change I would move that it so read.

M. PETTIT: I am quite willing that the change be made if it is the wish of the meeting to do so. I would like to ask the Association how we expect the Minister to carry out what we are asking him to do in that resolution, when it was all that he could do, and he vainly tried to get a larger appropriation than he has already expended, and when what we are now asking him to do would cost ten times that amount—roughly estimated at $300,000? No; the destruction we are asking for would cost such an amount the Minister never could carry it out; and what would be of great assistance to him, in my idea, would be for every Association in every country, or, even where they have not an Association, for all the leading fruit growers, to petition their representative in the House and urge upon him the importance of this work being carried out. That would very materially assist the Minister in carrying out what we are asking him to do.

The SECRETARY: I second this resolution as amended.

The PRESIDENT: I would just like to say in reference to the township I live in, the Scale has been found in that township in some 25 places, in every case, except two, on young nursery stock just set out from one to two years old. In every case it is entirely eradicated except the two where they were fully grown trees. Now, had that been allowed to spread our township soon would have been infested from end to end. To-day there are but two orchards at all infested. What is that worth to a township largely given up to fruit growing? I think that this work ought to be carried on at any expense by the Government, and the Scale stamped out. There may be sections where perhaps it would have to be carried on to a very large extent, but I think that the matter of a few thousand dollars ought not to be considered. I believe that had those trees been left in our township, probably inside of five years every orchard would have been infested. To-day we are clear except in two orchards, and they are in a position, I think, that can be safely controlled.

The resolution as amended was then put and carried.

Messrs. M. Pettit, the President, Robert Thompson, G. E. Fisher, Joseph Tweedle, E. Morris and E. D. Smith were appointed a committee farther to consult with the Minister of Agriculture in regard to this matter, and fully explain the wishes of this Association to the Department.

GEO. E. FISHER (Burlington): I would like to explain to the meeting two or three little matters in connection with our work for the investigation of the San Jose scale. It has been frequently stated, and no doubt you have read, that the Scale has been upon hardwood trees. There is one street in St. Catharines known as Robins street. On each side are trees, in which are planted fruit trees that are infested with the Scale. We have spent, on three or four different occasions, considerable time looking into the shade trees, which comprise hard and soft maple, and elm and horse-chestnut; and so far we have not been able to find any scale on those trees. At the north-east corner of the orchard of Mr. Aaron Cole, which is supposed to have been the original source of infestation in that section of the country, there is an elm tree. It is a tree which was probably six or seven inches in diameter, and was cut down to the surface of the ground. From the stump has grown up a second growth of elm, probably ten feet high at the present time and there were two Inspectors who spent considerable time on this tree, supposing we would be sure to find the Scale there, because a short distance from this elm was

a badly infested tree taken out; but we failed to find any Scale on that tree. Within ten paces of where the infested tree had been destroyed, we found a little elm which we examined very carefully, but found nothing. In the yard of Mr. Hutchinson, who lost upwards of a thousand trees from Scale, the trees were just alive with them. On the opposite side of the road is Mr. Stewart's place, which was badly infested, and just a little further to the south there is the Wilmot orchard in which there were some six or eight hundred peach trees which were very badly infested; and those were in the direct line of the prevailing wind, south-west from Mr. Hutchinson's door-yard, and we thought we should find some trace of the Scale in the shade trees, but we did not. Then on the other side of the road, a little farther to the north, there are about ten or fifteen acres of slashing in which there are all kinds of young growth, and we have spent a great deal of time in that slashing looking for Scale, without finding it. My information is that wherever the Scale has been seen on the elm tree it has been under very peculiar and extraordinary circumstances; but the scale is not likely to infest the forest trees—that it does not thrive on those trees where it is found. It has also been said that the men who were going about the country looking for Scale can't tell the San Jose scale from other species of scale. I say they can. Professor Howard, the chief entomologist of the United States, has made the statement that as a matter of fact a person with a little experience can determine the San Jose scale from the other species with a hand lens. That was our experience. Now then, it is also said that the Scale has been in the country a great many years, some say forty years. It might be worth while for me to state what is accepted as the only authentic history of the introduction and discovery of the San Jose scale. It was in the spring of 1887. Stark Bros., of Missouri, are a nursery firm doing a large business at a small town named Louisiana in that State. A nursery firm in California were propagating a plum that they called the Kelsey, and which they advertised as being curculio-proof. The Missouri firm made a purchase of these trees, and when the consignment came they proved to be so inferior on being examined that the Missouri firm rejected them, and wired the California firm as to what they were to do with them. The answer came that they were to send them on to New Jersey. They went into the hands of those two nurserymen with whom the scale was subsequently found. Now, this is the history of the introduction. In the meantime, Dr. Hodges, of Charlotteville, Virginia, had planted a pear orchard. In August, 1893, he found on some pears on those trees something which he supposed to be a fungus, and he sent two pears to the entomologist at Washington to have it made known to him what the trouble was. When they saw the pears they at once recognized the Scale, and sent a man back to Virginia to inspect the orchard. This Inspector returned to Washington in a short time and reported that he had found the whole place infested, and that the trees had been got from a nursery in New Jersey. Well, he was sent on to New Jersey to examine this nursery, and from the one nursery he went to the other and he found the Scale generally distributed in both these nurseries; and he also found that during those six years these nursery firms had been distributing the infested nursery trees all through the United States and into Canada; and this is accepted as the history of the introduction and distribution and discovery of the San Jose scale in the east.

EXPERIMENTAL SPRAYING IN 1899.

By W. M. Orr, Fruitland.

I am pleased to be able to report that the experimental spraying of fruit trees which has been conducted by the Department of Agriculture for Ontario

during the past five years, has again been productive of satisfactory results. —results which justify its existence. As in former years, the work was done regularly at 30 points scattered over the Province. It was intended to reduce the number of stations, but requests were so urgent that it was impossible. In addition to this an extra man had to be sent a couple of trips to a point which could not be included in the regular routes. Three agents were constantly on the road from April 25th to late in July, each point being visited six or seven times.

The attendance was largely in excess of any previous year, and enquiry for bulletins and information by mail was unprecedented.

Over 30 applications for the work in different localities had to be refused, and since the beginning of the season 15 other applications have been received.

Of course attendance is the standard by which we must estimate the interest taken in the work.

In 1896 only three stations could show a total attendance during the season of 100. In 1897, 7 stations came up to that mark. In 1898, 20 of the stations reported the attendance in three figures, and in 1899 no less than 27 out of the 30 stations made the century, the highest attendance at any one point being 281, at Southampton. The total attendance was 4718, being 1180 more than any previous year.

The mixture used was the old formula:

Copper Sulphate	4 lbs.
Fresh Lime	4 lbs.
Water	40 gals.

From 4 to 7 ozs. Paris Green was used with the above mixture according to the insects to be destroyed. As near as possible the following directions from the 1899 bulletins were followed:

First spraying: Bordeaux mixture and Paris Green when the buds are swelling.

Second spraying: Bordeaux mixture and Paris Green before the blossoms open.

Third spraying: Bordeaux mixture and Paris Green when the blossoms have fallen.

Fourth and fifth spraying: Bordeaux mixture and Paris Green at intervals of ten to fifteen days if necessary.

Systematic spraying is being taken up all over the country in the wake of the experimental work.

The manufacturers of spraying outfits have been unable to keep up with their orders even by working overtime. One of the largest manufacturers writes me: "In 1897 it was in 10's, in 1898 it was in 100's, but this year it was in 1000's."

The buyers appreciate more than ever the advantages to be derived from handling sprayed fruit, and I do not know of a single buyer who is not now an advocate of spraying. Some years ago the claim was made that sprayed fruit was larger, cleaner, better colored, better flavored, and that it possessed better shipping and keeping qualities than unsprayed fruit. This was a sweeping claim certainly, but one which has been fully proven by the records of the experimental work.

One gentleman told me that he had in one shipment to the old country this fall both sprayed and unsprayed apples. The sprayed arrived in splendid condition and brought satisfactory prices, only one barrel being slack. The unsprayed fruit was reported slack, wet and wasty, and did not pay the freight. This was especially gratifying as he was not inclined previously to favor spraying

One of the largest growers and most extensive shippers in Ontario, who-

until this season, would have nothing to do with spraying, told me recently that he had made up his mind that he would have to adopt spraying or give up growing.

This year's experience confirms my belief in the statement made at our meeting last year that the Codling Moth can be controlled by spraying throughout the greater part of Ontario, but in some sheltered localities such as the Niagara Valley bandaging will have to be used in addition.

To obtain some data on this subject I carefully watched a number of bandaged apple trees during the past season. The trees were sprayed.

Trees were bandaged June 1st and examined June 15th, but no larvæ was found.

July 1st a few larvæ and several pupæ were found.

July 15th as high as 128 found on single tree, rather more than half pupae.

July 29th as high as 161 on single tree, about half pupæ, also a moth just hatched under the band.

Aug. 12th as high as 119 found on a single tree, about one-sixth of which were pupæ.

Aug. 28th as high as 142 larvæ on single tree.

Sept. 15th	„	155	„	„
Oct. 1st	„	30	„	„
Nov. 4th	„	123	„	„

From a single Baldwin tree loaded with fruit we trapped in bandages 761 specimens, from July 1st to November 4th.

The bandages were examined every two weeks, which appeared to be frequent enough. Pupæ were found up to August 12th. If these require two weeks before the moth escapes, and the moth occupies from one to two weeks in depositing her egg, and another week is required to hatch the egg, we shall have larvæ attacking our apples up to the middle or third week of September. This, I am sorry to say, is about our experience in that locality.

An exhibit of sprayed and unsprayed apples was made at the Industrial Exhibition, Toronto. The owners of the orchards where the experimental work was done were invited to select and ship samples of sprayed and unsprayed fruit of the same varieties, which would fairly represent results of the work. The exhibit when placed formed a striking object lesson as to the value of spraying.

Some were incredulous and believed that the selections were not fairly made. Allow me to read you an extract or two from letters I received. Mr. H. McCormick, Paris, writes:—"You will think some of the unsprayed ones are very uneven in size, but I could not help it."

Mr. Jos. Sandy, Omemee, writes:—"More contrast in appearance of the trees than in the quality of fruit."

Joseph Ranton. Palmerston, says:—"I was afraid to send an honest exhibit for fear the people would not believe it possible to secure such results."

Probably the most striking contrast, and the one most criticized, was in the exhibit of Mr. J. Dance, Wiarton; but an inspection of the orchard fully justified his selection.

Record of Spraying.

Joseph Ranton's Orchard, Palmerston.

Spy.—Sprayed, 96 p.c. clean; unsprayed, 12 p.c. clean.
Snow.—Sprayed, 83 p.c. clean, heavy crop; unsprayed, 4 p.c. clean, light crop.
Ben Davis.—Unsprayed, 52 p.c. clean.
Astrachan.—Sprayed, 75 p.c. clean; unsprayed, 30 p.c. clean.
Cayuga Red Streak.—Sprayed, 92 p.c. clean; unsprayed, 48 p.c. clean.
Colvert.—Sprayed, 88 p.c. clean; unsprayed, 44 p.c. clean.
Russet.—Sprayed, 72 p.c. clean; unsprayed, 76 p.c. clean.

Mr. Ranton writes :—" Concerning the experimental spraying which was carried on in my orchard this summer, I would say the benefit derived from spraying is almost incredible. Last year I had not enough sound fruit for our own use, and this year, owing to the effects of spraying, we have enough for home use and sold 40 barrels besides. I have 100 trees in my orchard, and there were only 15 sprayed, and two-thirds of the fruit was on the sprayed trees. The foliage of the trees showed green and healthy looking beside those not sprayed. As an evidence of my relying on spraying I bought an outfit and every tree in my orchard will get the benefit next year."

This orchard is 30 or 40 years old, stands in a new sod, and is in fairly good condition. Mr. Ranton says he never sold over $10.00 of fruit from it in a year before. The crop last year was heavier than this, but there was scarcely any good fruit.

J. McNab's Orchard, Southampton.

Baldwin.—Sprayed, 80 p.c. clean ; unsprayed, 52 p.c. clean.
Spy.—Sprayed, 80 p.c. clean ; unsprayed, no clean fruit.
Greening.—Sprayed, 87 p.c. clean ; unsprayed, no clean fruit.
Colvert and Baldwins, unsprayed, heavily loaded, no clean fruit.
This orchard is in sod and fairly well cared for.

There are 80 trees in this orchard, but Mr. McNab has never sold any for packing, and never more than $10.00 worth in any one year previous to this year.

Mr. McNab writes as follows :—" The summer of 1899 was the first season my orchard was sprayed. The results were very marked. I would strongly recommend to all parties having orchards the benefits derived from spraying, the apples being much cleaner and finer in appearance, and the foliage remained green longer than previous years.

" I may also state that for the first time in my experience I sold my apple crop to buyers from a distance, thanks to spraying. Next year I hope to continue the spraying, and anticipate good results."

Mr. D. Gillander's Orchard, Wellington.

Talman's Sweet.—Sprayed, 96 p.c. clean : unsprayed, 76 p.c. clean.
Spy.—Sprayed, 92 p.c. clean ; unsprayed, 12 p.c. clean.
Holland Pippin.—Sprayed, 90 p.c. clean ; unsprayed, 15 p.c. clean.
Baldwin.—Sprayed, 100 p.c. clean ; no unsprayed trees.
Russet.—Sprayed, 100 p.c. clean ; unsprayed, 72 p.c. clean.

The packer who bought these apples said they were the cleanest he had found for years.

G. Lambert's Orchard, Thornbury.

King's.—Sprayed, 89 p.c. clean. This tree is 23 years old, and gives its first clean fruit this year.
Canada Red.—Sprayed, 93 p.c. clean, heavy load ; unsprayed, 20 p.c. clean ; most of the fruit dropped off.
Snow.—Sprayed, 84 p.c. clean ; unsprayed, 4 p.c. clean.
Greening.—Sprayed, 92 p.c. clean ; unsprayed, 4 p.c. clean.
Astrachan.—Sprayed, 90 p.c. clean ; unsprayed, 50 p.c. clean.
Cayuga Red Streak.—Sprayed, 88 p.c. clean ; unspraped, 57 p.c. clean.
Spy.—Sprayed, 96 p.c. clean ; unsprayed, 18 p.c. clean.
Alexander.—Sprayed, 85 p.c. ; always scabbed before.
Irish Peach.—Sprayed, 75 p.c. ; never fit for use before.

On November 23rd Mr. Lambert writes :—" With great pleasure I write the results of the Government spraying in my orchard this season. In the spring when the agent came upon the scene my orchard was infested with all kinds of insects, especially the forest tent caterpillar. At the first application the pest

was checked, and the general .tone of the orchard was good, foliage good, and fruit mostly set well. In gathering and packing every variety sprayed showed a marked advantage, scarcely any scale and much less codling moth than on the unsprayed trees. In all the varieties sprayed I would say there was an average of 80 p.c. to 90 p.c. of clean fruit. I feel convinced that spraying properly doné will pay better than any work on the farm."

The annual yield of apples in Ontario varies from 4,000,000 to 18,000,000 barrels per year. Estimating the average at 8,000,000 barrels. This can be increased easily by a third, and a much better class of fruit exported which would command an extra high price in the foreign markets. This is not supposition, but a conservative estimate, which is justified by the results obtained from a number of years thorough work in the experimental spraying.

Mr. PATTISON, (Grimsby): I would like for your information to criticize this spraying a little, and ask a few questions as to a thing that has puzzled me this season. I may say that I have personally sprayed with Paris green for a great number of years with fairly good results. This year for the first time I sprayed with copper sulphate and the Bordeaux mixture, and very carefully. My experience goes to show that in our district, while a very excellent application for the foliage, and also for the fungus spot, that the mixture of the Bordeaux mixture and the Paris green totally kills the Paris green. And in order to show you that I am not saying this without some reason, I left some of my trees and sprayed them only with the Paris green. A neighbor of mine, who has a nice plum orchard, told me that the curculio was working badly in his plums. He said he had never sprayed, and I let him have my old pump and he sprayed his plum crop very carefully with Paris green without any copper sulphate. He had a full and excellent crop of plums. I sprayed my orchard rather more often than he did, but I used the copper sulphate with the Paris green, according to the formula, on my plum trees The result was that the curculio fattened on that application and actually screamed for more (laughter); and I lost two-thirds of my crop. It had apparently no effect whatever on the curculio. On the apple trees that were only sprayed with Paris green without the sulphate the proportion of clean fruit was about two-thirds, and on those sprayed with copper sulphate there was hardly any fruit to be found. Of course last season was a dry one, and the spot did not work to any great extent. Now, my explanation of this is that the lime kills the Paris green. Of course lime is absolutely necessary to prevent the sulphate of copper from injuring the foliage, but my experience is that the lime totally kills the effect of the Paris green. I have been enquiring into the subject since then, and find that several others have the same experience, I should like an explanation of this, because it cost me between $400 and $500 to find this out, if I have found it out.

Mr. THOMPSON: It is a common practice with us to mix Paris green with either land plaster or lime on potatoes, and we find it is a dead shot every time.

Mr. HUGGARD: I found in spraying with Paris green and lime for potatoes there were no beetles left when it got dry, but where we simply mixed the Paris green with water I sprayed three times and it did not kill them all.

Mr. PETTIT: Mr. Pattison's Paris green has been badly adulterated.

Mr. PATTISON: How do you account for the fact that those trees that were sprayed with the Paris green without the sulphate worked all right? I am not asserting anything; I only suggest that as a reason. I cannot see any other. If anybody can I will be very glad to know it.

The PRESIDENT: The survival of the curculio would indicate to me that the Paris green must have been adulterated, and it was just strong enough to make them sick and not strong enough to kill them. I have been spraying my own plum orchard with Paris green in this way for the last ten years, and it has been entirely satisfactory, and that has been the almost universal report.

Prof. SAUNDERS: I do not see how it is possible that the mixture of Paris green and lime would destroy the action of the poisonous principles in the Paris green. The Paris green is an arsenic of copper which is quite insoluble, and if lime was mixed with it I cannot see chemically how it would alter its nature so as to lessen its poisonous action. We know that London purple, which is a compound of Paris green and lime, has been used in many localities, and I never heard of its having lost any of its poisonous properties by having been associated with the lime. We know that Paris green is largely adulterated, and it may be that Mr. Pattison has got hold of a sample that was not up to the mark in strength; but I think it would be very unwise to allow any impression to go out from this Association that Paris green, when associated with lime in the Bordeaux mixture, is lessened thereby of its poisonous effect. The sulphate of copper when mixed with lime forms a mixture of oxide and carbonate of copper in suspension, and a good deal of the strength of the lime is utilized in making that change in the copper salt, so that it is not at all in as strong a caustic condition as it would be either in its association with arsenious acid in the London purple or in the case of an acid where the Paris green was associated with freshly slacked lime.

The PRESIDENT: In spraying plum trees with Paris green without lime you have to be very careful indeed, or you will seriously damage your foliage.

Mr. PATTISON: I have done it for years without any serious damage, until this year.

The PRESIDENT: What proportion did you use without the copper sulphate?

Mr. PATTISON: Two and a-half ounces to forty gallons of water.

SOME RESULTS OF EXPERIMENTS IN SPRAYING AT THE CENTRAL EXPERIMENTAL FARM IN 1899.

By Prof. W. T. Macoun, Central Experimental Farm, Ottawa.

During the past ten years spraying has been one of the prominent features of the work of the Horticultural Division at the Central Experimental Farm. In 1890 the late Horticulturist, Mr. John Craig, began experiments in spraying, and ever since that time this work has been carried on with vigor, and no opportunity has been lost in impressing upon the fruit growers of Canada the great importance of it. In 1890 the use of the Bordeaux mixture was confined to a small number of the most progressive fruit growers and experimenters, while to-day it is a well recognized fact that if a man does not spray he will not, as a rule, have first-class fruit. The reports of the Experimental Farms containing the results of experiments in spraying, and the Spraying Calendars which have been issued during the past ten years, must have been of great service to the fruit growers of Canada, judging by the many letters which have been received testifying as to the value of the information given and the good results obtained by following the instructions in the reports.

It has been my endeavor during the past two years to give as much attention to experiments in spraying as time would permit, and also to adopt the best practices in the spraying of the fruit trees in the orchards at the Experimental Farm.

During the past year the experiments conducted have been of a very interesting nature, and it is hoped that the results will be of some service to our fruit growers.

Many of you have probably read Bulletin No. 38 of the Missouri Agricultural Experiment Station, in which are related certain experiments which were conducted by Prof. S. C. Whitten, the Horticulturist, the objects of which were to

prevent the winter-killing of the flower buds of the peach. Let me give his summary of results, which will give those of you who have not read this Bulletin an idea of what was done.

"I. In this latitude, winter killing of the fruit buds of the peach is usually due to the unfavorable effects of freezing after they have been stimulated into growth by warm weather, during winter or early spring.

"II. The early swelling and growth of the buds is due to the warmth they receive, is practically independent of root action, and may take place on warm sunny days in winter, when the roots are frozen and dormant.

"III. Peach fruit buds may safely endure a temperature of ten or twenty degrees below zero, provided they mature well in autumn, are entirely dormant, and the cold comes on gradually.

"IV. Zero weather may kill fruit buds that have swollen during previous warm weather, or that were not properly ripened in the autumn.

"V. Shading or whitening peach trees to prevent their absorbing heat on sunny days, opposes growth of the buds and is, consequently, a protective measure.

"VI. Shading the trees with board sheds enable peach buds to survive the winter uninjured, when eighty per cent of unprotected buds were killed.

"Trees protected in this way blossomed later, remained in bloom longer, set more fruit in proportion to the number of apparently perfect flowers, and held their fruit better than any other trees on the Station grounds. This is the most effective means of winter protection tried at the Station, but it is probably too expensive for commercial orchards.

"VII. Whitening the twigs and buds by spraying them with whitewash is, on account of its cheapness and beneficial effects, the most promising method of winter protection tried at this Station.

"VIII. Whitened buds remained practically dormant until April, when unprotected buds swelled perceptibly during warm days late in February and early in March.

"Whitened buds blossomed three to six days later than unprotected buds.

"Eighty per cent of whitened buds passed the winter safely, when only twenty per cent of unwhitened buds passed the winter unharmed.

"IX. Thermometers covered with purple material registered, during bright sunny weather, from ten to over twenty degrees higher than thermometers covered with white material of similar texture, thus indicating that whitened peach twigs might be expected to absorb much less heat than those which were not whitened."

As the question of the winter killing of the fruit buds of the peach is a matter which interests many of our own fruit growers, I desired to be in a position to state whether the results obtained by Prof. Whitton could be repeated here or not. But not having any peach trees at Ottawa on which to try the experiment the test was confined to plums, cherries, and apples.

The number of trees used were: Plums, 5; cherries, 3; apples, 6.

Whitewash was made by using unslaked lime, skim-milk, and water in the proportion of:

Skim-milk	6 gallons
Water	24 "
Lime	60 pounds

The lime was slaked in warm water and the remainder of the liquid added. It was then strained through a one-twelfth inch mesh, and was ready for use. As the experiment was not on a very large scale, a hand pump, the Spramoter Jr., was used with a Bordeaux nozzle, which worked very satisfactorily. The first spraying was given on 16th February, and successive spraying were made on 21st and 25th February, 1st, 10th, 13th March, and 1st April, six in all, the objec

being to keep the trees pure white from top to bottom until warm weather came in the spring.

The following notes were taken at intervals from the latter part of the winter until warm weather :—

Plums.—April 5th: No apparent swelling of the buds on either sprayed or unsprayed trees.

April 15th: No apparent swelling of the buds on either sprayed or unsprayed trees.

April 20th: Buds on unsprayed trees very slightly swollen; buds on sprayed trees still apparently dormant.

April 24th: Buds on unsprayed trees of Americana class slightly swollen; on sprayed trees, just perceptibly. Buds still apparently dormant on sprayed and unsprayed trees of Domestica class.

April 29th: Flower buds on American plumbs now showing quite generally on unsprayed trees, a few flower buds showing on sprayed trees, but difference very decidedly marked, not so much swollen. Buds on unsprayed European plums just starting perceptibly. On sprayed trees still apparently dormant.

May 2nd: Flower buds now exposed on both sprayed and unsprayed trees, but difference more marked than before. Greater contrast in buds on unsprayed and sprayed trees of European plums. Buds on sprayed trees have only swollen slightly.

Temperature was above 80° F. on 30th April, and 1st May and 2nd May, causing rapid swelling of buds. It would be impossible now to keep buds covered with lime unless sprayed every day.

The dates of blooming of the plums sprayed and unsprayed were:

Jessie (American), unsprayed ..... 22nd May.
" " sprayed ..... 24th May.
Early Red (European), unsprayed ..... 13th May.
" " sprayed ..... 22nd May.

A considerable number of blossoms on the Jessie plum were killed by the whitewash, but the plums on the sprayed trees were larger than on the unsprayed, and there was the same quantity of fruit on it as on the unsprayed tree. The two trees were about the same size.

There were only a few blossoms on both sprayed and unsprayed trees of the Early Red plum. There were about the same number of blossoms on both trees.

A tree of a hybrid between the Sand Cherry and the American plum in the Director's garden was sprayed with the whitewash and a considerable number of buds were killed by the wash.

Cherries.—April 5th: Buds on unsprayed trees swollen very slightly; on sprayed trees, still apparently dormant.

April 15th: Buds on unsprayed trees swollen slightly; on sprayed trees still apparently dormant.

April 20th: Buds more swollen on unsprayed trees; on sprayed trees, just starting to swell. A tree, part of which was sprayed and part unsprayed, has buds more swollen on unsprayed than on sprayed parts.

April 24th: Difference between sprayed and unsprayed cherry buds very apparent now.

April 28th: Still greater difference between sprayed and unsprayed buds, though sprayed have swollen considerably.

May 2nd: Still a marked difference between sprayed and unsprayed.

There were no flowers on either sprayed or unsprayed trees. There was no apparent injury from the use of the whitewash on the trees.

Apples.—April 5th: Buds apparently still dormant on unsprayed and sprayed trees;

April 15th: Buds apparently dormant on sprayed and unsprayed trees.

April 20th: Buds on unsprayed trees very slightly swollen on the 20th; on unsprayed trees no perceptible swelling is noticed to-day. Buds of sprayed trees still apparently dormant.

April 28th: Buds swollen slightly on both sprayed and unsprayed trees.

May 2nd: Buds are still only slightly swollen on sprayed and unsprayed trees; no apparent difference.

The results here given are sufficient evidence of the fact that the retarding of the swelling of the buds was quite marked on trees of plums and cherries. The difference in the dates of blossoming was slight in the American variety but greater in the European. A considerable number of the blossoming buds of plums were killed by the whitewash. As the buds on apple trees do not swell until late, the whitewash appeared to have little affect in retarding the swelling of them.

I am not yet prepared to say whether it would be practical or advisable to spray peach trees to prevent winter killing of the buds, but from the apparent effects of the whitewash in ridding apple trees of the Oyster Shell Bark Louse, it is well worth further experiment to determine whether the same results could not be obtained in treating the San José scale on peach and other fruit trees, and in the case of peach trees it might serve the double purpose of retarding the swelling of the buds and killing the scale.

Notwithstanding the thorough spraying which the trees in the orchards at the Experimental Farm have received, the Oyster Shell Bark Louse, which has affected the apple trees for several years, has never been entirely destroyed there. Last spring, all the apple orchard, with the exception of the trees which had been whitewashed, received two sprayings for the purpose of, if possible, destroying this pest. Careful watch was kept for the day when the young lice made their appearance, which the first ones did on the 29th May. On 1st June the trees received a spraying of tobacco water and whale oil soap, made by using ten pounds of tobacco and two pounds of whale oil soap to forty gallons of water. Specimens of the young insects were examined under the microscope and where found to be dead within an hour of the time they were sprayed. On the 6th June the trees were sprayed a second time with whale oil soap, eight pounds to forty gallons of water. This was supposed to kill anything that was left. Although their number was much reduced, there must have been a considerable number escaped, as healthy scales were found in the orchard later in the summer.

But to return to the whitewash: It will be remembered that these trees were not sprayed in the spring when the trees were treated for the louse. What was my surprise during the summer after the whitewash had come off to find the trees practically free of the bark louse. All the old scales had disappeared, the bark of the trees was bright and clean, and had altogether a healthier appearance than those under otherwise the same conditions. Now none of these trees were examined for bark louse before they were sprayed, but considering the fact that the remaining 72 trees of Wealthy, 31 of Duchess, 26 of Tetofsky are all from slightly to badly affected with old scales.

There is, I think, ample evidence of the wonderful effect of the whitewash on this insect.

Experiments are now in progress at the Farm to determine, if possible, the best time to whitewash the trees to get the best results, the number of applications necessary, how long before the whitewash takes effect, and any other point which may come up. It is proposed to try some experiments in some orchards affected with the San José scale, to see what effect it will have on that pest. I hope to be able to communicate the results next year.

The use of lime in whitewashing the trunk and large limbs of trees is an old custom and still adopted by a few. It was supposed to be a cure-all, and I have not been able to learn just what effects it really had.

Lime was recommended by Forsyth in 1802 for the destruction of Aphis and Red Spider. His formula was:

Unslaked lime	½ peck.
Water	32 gallons.

It was applied by means of a syringe.

Air-slaked lime is used successfully in destroying slugs on the foliage of trees.

Lime was recommended in 1850 against the curculio of plums by Lawrence Young, Louisville, Kentucky, and it was said to have been used successfully by him. "It consists simply in covering the young fruit as soon as danger is apprehended with a coating of thin lime wash, considerably more dilute than the mixture used in whitewashing."

In Bailey's Horticultural Rule Book we find lime spray recommended to prevent the attacks of the Rose Chafer. The formula reads: "Slake one-half peck, or a peck, of lime in a barrel of water, straining the lime as it enters the barrel, to prevent its clogging the pump. Apply in a spray until the tree appears as if whitewashed."

Nowhere have I found that trees have been whitewashed for the purpose of killing scale insects.

Prof. SAUNDERS: I have much pleasure in supporting what Prof. Macoun has told you with a remark or two as to the conclusions reached by myself from very careful examination of those trees which were operated on with the whitewash. We have suffered for a long time at the Central Farm with Oyster Shell Bark Louse, and they work persistently at it every year with the hope of getting clear of it, but have not been able to get our trees entirely clean. During the past year Mr. Macoun has made a strong effort with tobacco to rid the orchard of this pestiferous scale, and I think has succeeded with a great many trees in almost entirely removing them; but I was very much surprised on examining those trees which had been sprayed with lime to see how thoroughly the work had been done, and when the lime was washed off and all the scales, old and young, were entirely removed, and I failed to find on several trees examined anything in the shape of scale left. This whitewash was not applied with the idea of removing the Oyster Shell Bark Louse, but rather to ascertain how far the whitewash would delay the opening of the buds; but the incidental result is most surprising and most gratifying to me, and I hope it will be tried in those sections of the country where the San José scale is abundant, and we shall hear something further as to whether it may not be useful in this way. The complete covering which the lime gives to the twigs is, as Mr. Macoun has very well said, easily seen, and it is so complete that it must prevent the access of air to the scale. It will also, because of its caustic nature, have a penetrating effect on the scale itself; and I am hopeful that we shall find in this lime application not only a thorough application for the Oyster Shell Bark Louse, but also a remedy which will be useful in every case of the scale.

Mr. TWEDDLE: Before we leave this subject I think we ought to have a little discussion on the Codling Moth, and I want to corroborate what the president has said on the point. I believe we ought to make the bands for the destruction of the codling moth compulsory by Act of Parliament, the same as we do with the black knot; and I think in proportion to the amount of work and expense with the bands we get great results. I have about 75 acres of apple orchard this last season with bands on every tree. and I can say that we caught any amount of moths, but we did not save the crop, and that is the trouble, because nobody else in the neighborhood used those bands but Mr. Orr and myself. I think is everybody were compelled to use those bands we could save our crop, or a large proportion of it. I do not see why we should not ask our legislature to pass an

Act on the local option plan just the same as our Black Knot Act, and have municipal councils pass a by-law to force it, on the petition of ratepayers. I should like to see this put in the hands of some of our committees. The winter through, those bands will collect as many as 200 moths to a band. If all of us would do that we would start off with a clean sheet in the spring.

E. D. SMITH: I think Mr. Tweddle is exactly on the right track. My experience has led me to believe that we cannot expect to control the codling moth with Paris green. I have sprayed with Paris green a good many years and this year made a most thorough test under your own supervision.

The PRESIDENT: Up to a given date.

Mr. SMITH: Yes; I sprayed the trees five times under your instructions; and in addition to that, not having confidence in it for the Codling Moth, but having the confidence in the spraying chiefly for the scab—I have great confidence in it for that—I determined to go back to what I had made up my mind to do ten years before the spraying came into vogue, namely, the bandage, and I put the bandages on early. My orchard has been clean for twenty years, and the trees were scraped clean, so there was no place for the Codling Moth to go but under these bandages. The bandages were put on early and inspected once a week all summer. The consequence was that when the apples were about the size of walnuts we found no Codling Moth, hardy could find a specimen in the orchard, and thought we should have perfectly clean apples. Later on, however, I found some moth under those bandages, and they were killed once a week, but not in great numbers—from five to twenty a week under each bandage would be about the average Now, there was not a Codling Moth that came in those bandages but what was killed. The spraying was done thoroughly, and up to the time the apples became the size of walnuts no Codling Moth could be found; but what was the consequence? At the end of the season we found from three-fourths to seven-eights of our apples with worms in! Now where did they come from? The only conclusion I could arrive at is that they came from the neighbor's orchard across the road who did nothing, neither sprayed nor put bandages on. Is it not discouraging, then, for a number of men to continually go to this expense, spraying aud bandaging their trees, if it is going to be of no avail because a neighbour's orchard across the way is neglected? I cannot see any remedy except that suggested by Mr. Tweddle, that under a local option, just like our Yellows and Black Knot Acts, a law be put in force in the township. It is no great expense or hardship; it is surprising how little it costs. If these bandages were put on a ten acre orchard the only cost is the labor of one man one day to take them off and examine them and kill the worms. That, conducted for five weeks, would only be a matter of $5 on a ten acre orchard, aside from the initial expense, which does not amount to very much either. These bandages would last many years. I think there is a great deal in Mr. Tweddle's suggestion. It is the only solution I can possibly see of the Codling Moth.

Mr. TWEDDLE: Some eight or ten orchardists used bands, and every man said they were the best preventive they ever saw; they all believed in them and they believed it would be a good thing to make it compulsory.

Mr. CASTON: What did you use for bandages?

Mr. TWEDDLE: Just this rough canvas. (Shown.)

The PRESIDENT: There is one that has been used a year.

Mr. TWEDDLE: We sprayed with half a pound of Bordeaux mixture to forty gallons of water and we found one in four of the Codling Moths dead. It did not prove effectual enough; but with all the bands the Codling Moths came from somewhere else. We had an orchard just like Mr. Smith's. Up till the middle of August you could not find a moth in them, but the last of the fruit so multiplied them that they spread all over. At one orchard on the lake shore we took out

43 barrels of No. 1 ; 100 bushels were effected by the moth, just about the best of the fruit.

A MEMBER: How do you use the band ?

The PRESIDENT: Roll it around the tree as a bandage and tie it with binder twine. It is just the harbor that they want. In regard to Mr Smith's orchard, I might say that in my last year's report I said I purposed taking some orchards and carrying on the spraying with the Paris green right up to picking time to see what results we would have ; but the Department decided the work should not go on the latter part of July and August, so that put an end to that. Mr. Smith says that up to the time the apples were a little more than half grown there was not a sign of Codling Moth Up to that time he had been spraying. Now if his neighbors supplied all the Codling Moth that destroyed all the crop later they certainly would have supplied some to damage the early crop. What we should do is to continue spraying right up to the time of picking. We know that the Codling Moth is working right up till the apples are picked, because we find the young worm just hatched even after the apples are picked, which shows that the egg could not have been laid more than two weeks at most. To make a thorough test of it I am satisfied we will have to continue spraying right up to the time of picking.

A MEMBER: Would it not remain on the apple ?

The PRESIDENT: I do not think so; not to do any harm. I never saw a case where it would have the slightest effect in that way.

Mr. JONES: A person could continue the Bordeaux mixture and not the Paris green.

The PRESIDENT: There will be no need of continuing the Bordeaux mixture, just the Paris green. While we are badly infested with Codling Moth in the southern section, in the northern section they have only one brood, and the regular experimental spraying almost controls it ; but the Oyster-shell Bark Louse, from the Ottawa River right through to the back of the Province, is exceedingly bad, probably ten times as bad as it is with us at the front I think we must have some parasite in the southern section that destroys the Oyster-shell Bark Louse, but in the northern section it seems they have not any. I saw full-grown apple trees at Shelburne killed with the Oyster-shell Bark Louse. If it can be killed by spraying with lime it will be a great boon to this country and and to apple growers. We will be very glad to know more of the experiments and results.

Mr. CASTON : I believe that the application of bands on the trees is one of the best methods that can be adopted for keeping the Codling Moth in check. I believe we have two broods in the more northern section, and they travel around a good deal seeking shelter for the winter, and also the larvae travel around seeking a place to breed. I accidentally made a little experiment in that line. I had a piece of canvas that was used for a bed of onions, and when I was through with it I accidentally placed it in a Pewaukee tree that stood there—just a young tree beginning to bear, with only half a dozen apples on it : and later on in the fall, I think in November, I saw that piece of canvas still in the tree and thought I would examine it, and found either 32 or 34 moths in that. Now, they did not all come from that tree, and it stood at a considerable distance from the other. They could not have come from that tree, because there were only three or four apples on it, and if I recollect rightly I think most of them were sound. So it shows they travel a considerable distance, and they had gone up three or four feet from the ground and made their nest in the rag, and 32 or 34 had settled there for the winter. It would be a good plan to have a bandage that could be removed rapidly, and have a kettle of boiling water and a fire in the orchard, so that the bandage could be removed and dipped into the scalding water ; we would then have in our hands one of the most effective means of dealing with this pest. It is a lamentable

thing to have to throw first-class apples among the culls because of two or three worm holes. I was very much gratified to hear about the excellent results of spraying with lime with regard to the Oyster-shell Bark Louse. If that fact alone is established it is worth probably half the cost of the Experimental Farm at Ottawa to the fruit growers of this country. (Applause.) It is going to be a grand thing, and I will tell you why. In the northern sections we have the Oyster-shell Bark Louse very bad. I find no difficulty in dealing with it on the trunks and limbs of the tree where it can be reached, because I make it a practice to go over the trees with the alkali. I use lye strong enough to float a boat, and dilute it with water, one part to six. For smaller trees I dilute it still more. I make it a practice to scrape off the bark on the bearing tree and give them a drink of that lye once in two years, and that effectually removes the Oyster shell Bark Louse and has a good healthy effect on the tree; but they spread themselves over the tree where you cannot get at them. I use an old birch broom for that, and it has a good effect as far as you can reach them, but away out on the twigs you can't get at them with anything of that kind. Now, if this spraying with lime will remove them, and we have good evidence that it will, I think that that is a very valuable fact itself to the fruit-growers of this country. In regard to the Bordeaux mixture I have used it for potatoes, for rot and for Colorado beetle, and found it was just as effective when mixed with lime as with Paris green. Some of us might like to try experiments this winter along the line of lime spraying. When should we do it?

Prof. MACOUN: My impression is the best time would be toward spring, because the Scale at that time would be getting softer if the weather were at all mild. At this time of the year the Scale is probably harder than in any other part of the year, except perhaps the latter part of February. I should imagine the best time would be from the end of February until the bud starts to swell. I would not like to risk it after that, because I do not know what affect it would have.

Prof. SAUNDERS: What time was your spraying made?

Prof. MACOUN: On the 10th or 15th February. I may say my experiment at the farm is in this way: I am trying some trees with one application of lime others with two, others with three and others with four applications, because I want to find how much lime it takes to kill those insects. It may be that they are smothered, and if so it will take considerable time to do it. If it is the caustic nature of the lime two applications will be enough, because you can get a tree covered with two applications. I thought of discontinuing till about February and then starting and going on till spring again with four or five or six applications, to find out just how much lime it would take. In regard to the San Jose scale, it seems to me quite possible that if there was a thick enough coating of lime on the peach trees just when the young insects come out in the spring, they would not have anything to feed on, and it is possible they would die of starvation.

Mr. CASTON: You have not found the lime affect the tree injuriously?

Prof. MACOUN: Not the apple trees. On the Duchess we have the best crop on one tree that we sprayed, and the trees had a much healthier appearance this summer.

Mr. SPOHN: Would a brush do as well as a spray pump?

Prof. MACOUN: You could not do it on the tops of the branches.

Mr. SPOHN: Suppose they were small-sized trees?

Prof. MACOUN: I don't think they could do it fine enough with a brush. It needs to be spread as fine as possible so as to get in all the cracks.

The PRESIDENT: I would like to ask Prof. Saunders how far he thinks the Codling Moth will pass from one orchard to another?

Prof. SAUNDERS: I think it quite possible for the Codling Moth to travel many miles. It is a very active insect when on the wing. I have often watched them in flying, in the house particularly. They do not usually fly to light, in the way some other moths do, but occasionally one finds a specimen in the house, and I have been struck with the wonderful power of flight they have for so small an insect, and how long they will keep on the wing, and how active they are. So I do not think there is any doubt that they will travel a mile or two seeking suitable locations for depositing their eggs. Of course the instinct to search and find suitable locations for depositing the eggs is very strong in all the moths, and many of them will live under the most difficult circumstances for days until they have deposited their eggs, and they will exert themselves to their utmost to find a suitable place to put them.

The PRESIDENT: This tree from which we took off over 600 this year, is an isolated tree. There are orchards near by that have never been treated. and I think it must have been largely infested from those orchards. Now, if that is the case it is useless for one man to spray and bandage unless his neighbor does it, or has to do it, and I think this matter of legislation might be taken up—a committee appointed to investigate and at least look into the matter. Do you think such a thing would be feasible ?

Dr. SAUNDERS: We know the Black Knot law is not very well carried out. It is not wise to have too many laws that are inoperative. If it could be made a matter of option in different counties, as has been suggested, I do not see why it should not be made of very great use. In regard to the larvæ you found under the bandages, they must all come from a reasonable distance from the tree on which you found them. I do not think it would be possible for a larvæ of that character to travel anything like a mile looking for a location on which to go into chrysalis; they would not likely travel half that distance. Probably 100 yards would be as far as they would go. They do not begin to seek a hiding place until they are fully grown, and they usually take the first good spot they find to change into chrysalis. They are active mainly at night, and they crawl about then in search of a suitable spot; and in the case reported by Mr. Caston, where there were so few apples, on the tree, no doubt these larvæ came from some other trees in the same orchard.

Mr. CASTON: Suppose we have very clean cultivation in our orchard ?

Dr. SAUNDERS: That does not affect them; they can get over all the quicker if it is clean. They will not go into chrysalis on the ground as a rule. They want the crevices in the bark on the tree to make their change, and that is what they look for, and in that case they travelled from some of your other trees, dropped on the ground in the fruit, or dropped sometimes before the fruit matured, by means of a thread, and then they travel about until they find a suitable locality.

Mr. CASTON: They must come a distance of 200 trees.

Dr. SAUNDERS: Yes, they could easily travel that, or at least 200 yards.

Mr. TWEDDLE: That just makes the matter all the more necessary. The trouble is that the moth comes and lays the egg, and the egg hatches and goes through the process before you can catch it at all, and that is where the difficulty comes in. We would like other people to catch them before they get into our orchards.

E. D. SMITH: What Mr. Tweddle just says is important. It is evident in my own case from what I caught under these bandages that there were not very many, and there were apparently none in the apples; I caught them all that were off my own orchard, but the apples had eggs laid in them from somewhere else. These were flying moths. They were hunting apple trees with apples on, and, as Prof. Saunders says, they fly quite a distance. They could easily fly across the road to a neighbor's orchard and lay their eggs there. I think it is

high time we took some action in this matter. Prof. Saunders says the Black-Knot and Yellows Act has not been very successful. Well, I believe not in many places, but in our township and others where fruit growing is carried on in a large way, and the fruit growers are interested in the matter, it is carried out. All that is necessary is that twelve ratepayers go to the council, and they must appoint an inspector, and on the report of that inspector any one who has his orchard infested with this must destroy the trees. I believe if the same option were given to the township of Saltfleet we would take advantage of it and every tree in the township would be bandaged, and then we would see whether the Codling Moth would not be eradicated.

A committee was then appointed to deal with the matter, consisting of Messrs. J. Tweddle, E. D. Smith, W. M Orr and A. H. Pettit.

NEW HARDY FRUITS FOR MANITOBA AND THE NORTH-WEST TERRITORIES.

By Dr. Wm. Saunders, F.R.S.C., F.L.S., Director Experimental Farms Ottawa.

During the past twelve years, since the Dominion Experimental Farms were established, persistent efforts have been made to find some hardy varieties of apple which would endure the climate and bear fruit in the Canadian North-West. Varieties have been brought from all the northern Countries in Europe where apples are grown and all the different sorts obtainable which have originated in the north-western parts of the United States have also been carefully tested. In this way more than 200 varieties have been tried, some in the open and others with different degrees of protection and shelter, but none have succeeded. While it is possible some seasons, where special shelter and protection are available, to grow in Manitoba the Transcendant and Yellow Siberian Crabs and a few of the hardiest sorts of Russian apples, this has only been done under very exceptional conditions and in localities where the altitude above sea level is not great. All attempts to grow these varieties in a general way under such conditions as are available to the average farmer have resulted in failure, and the conclusion has been forced on us that notwithstanding the few partial successes which have been recorded, that the growing of the hardiest sorts of apples at present available in a general way in that north-west country is quite impracticable.

Experiments were early tried with the wild crab apple of Ontario (*Pyrus coronaria*) thinking that possibly from this source some hardy and useful sorts might be obtained, and several hundred seedlings were raised at Ottawa from seed collected from wild trees in Ontario. These were sent to the experimental farms at Brandon and Indian Head and planted there under different conditions as to shelter. A few of them survived in a partly killed condition for a year or two and then died out. Experiments were also tried with seedlings of another wild crab known as the Berried Crab (*Pyrus baccata*) the seed of which was obtained from northern Siberia, and the young trees grown from this seed have proved entirely hardy at both the western experimental farms and have started each spring from the terminal buds on their branches since they were planted. They have also borne fruit, but this has been so small as to be of little value.

In the spring of 1894 this small wild crab was crossed with several varieties of hardy apples such as Tetofsky, Wealthy and Duchess, also with some of the larger crabs, including Transcendant, Orange and Hyslop. From the seeds obtained from this work of crossing, young trees were grown which when one

year old were planted in a small orchard. They have grown very rapidly and have made handsome young trees more or less pyramidal in form and branching close to the ground. During the past season thirty-six of these cross-bred sorts have fruited and some of them have borne heavy crops Among these there were five which produced fruit of such size and quality as to warrant their being named and propagated for more extended trial. The fact of their having fruited so freely on the fourth year from the sowing of the seed indicates a prolific and early bearing habit. The names and descriptions of the five selected varieties are here given in what is believed to be the order of their merit.

Charles.—A cross of Pyrus Tetofsky on *Pyrus baccata.* Tree a very upright and vigorous grower with large leathery leaves of considerable substance. The blossoms are deep pink in bud, pinkish white when open, large, with wide petals. The fruit set well and was distributed very evenly over the tree. Ripe Sept. 3rd. Size, 1 9-16 inches across, 1 6-16 inches deep, very distinctly ribbed. Colour a uniform yellow, very attractive. Flesh, yellow, solid, crisp, juicy, very mildly acid and very mildly astringent. Flavor pleasant, skin rather thin, bakes well. When compared with the Transcendant crab the size was practically the same, the acidity and astringency a little less. Stem long, calyx persistent.

Novelty.—A cross of Wealthy on *Pyrus baccata.* Tree fairly upright in habit and a vigorous grower, with good foliage. On this tree there were only a few bunches of blossom, which were deep pink in bud, white when open, flowers large, petals broad. Fruit ripe Sept. 19th. Size, 1½ inches across, 1¼ inches deep, smooth. Colour, deep red. Flesh a pale yellowish pink, firm, crisp and juicy, sub-acid and of fair quality. Stem long, calyx unusually persistent. Bakes well, quality when cooked very fair. The largest and best of the Wealty crosses which have yet fruited.

Aurora.—A cross of Tetofsky on *Pyrus baccata.* Tree a vigorous grower, upright in habit, with large thick leathery leaves. Blossomed freely. Flowers deep pink in bud, large when open, pure white, petals broad. Fruit sat freely and was ripe September 11th. Size, 1 7-16 inches across, 1 3-16 inches deep. Colour bright red almost all over, very pretty. Flesh crisp, juicy, acid and of fair flavor, astringency very slight. When baked this fruit is acid, but of good flavor. Stem long, calyx persistent.

Progress.—A cross of Wealthy on *Pyrus baccata* The tree is a vigorous grower and fairly upright in habit. It blossomed freely; the blossoms were deep pink in bud, pinkish white when open, flowers large, petals wide. Fruit ripe September 14th. Size, 1 5-16 inches across, 1 3-16 inches deep. Colour red, with some yellow and a dark red cheek. Flesh very firm, crisp, juicy, sub-acid, astringency scarcely perceptible, of fair flavor. Stem long, calyx persistent.

Prairie Gem.—A cross of Tetofsky on *Pyrus baccata.* This tree is a moderately vigorous grower and rather spreading in habit. It was heavily laden with fruit from top to bottom. The tree was covered with blossoms, which were pink in bud, white when open, of medium size, with petals of medium width. Fruit ripe August 30th. Size, 1 inch across and one inch deep. Color, brilliant yellow and crimson Flesh crisp, juicy, acid, flavor good, almost free from astringency, excellent for jelly. Deficient in size of fruit, but promising for its earliness, quality and profuse bearing habit.

All these varieties are remarkable for the persistent manner in which the fruit is attached to the tree, The stems are so firmly fastened that they require a considerable effort to detach them. The trees are all very strongly built, with the branches bound to the trees with bundles of woody fibre which are difficult to break. Root grafts were made of some of these varieties two years ago on account of their thrifty growth and promising appearance and sent to the western experimental farms where they have stood the test of one winter; a further supply was sent for the same reasons last spring. Now, that these five have fruited and

promise to be of value, they will propagated more freely and tested in different parts of the northwest country. There seems every reason to expect that they will prove hardy, and if they can be grown by the average farmer there under ordinary conditions, they will undoubtedly be much appreciated.

As the five varieties described have all been selected from the first 36 of these crosses which have fruited, it is probably many other equal and possibly superior sorts may be found as other cross-bred sorts come into bearing. The work of cross-fertilizing has been continued and there are yet 270 of the crosses on *Pyrus baccata* which which have not fruited. These include crosses with Duchess, Yellow Transparent, Wealthy, Simbirsk, Oeimoe, Kursk Anis, Krimskoe, Herren, Pewaukee, Tetofsky, McIntosh Red, Excelsior, Broad Green, Haas, Scott's Winter, Ribston Pippin, Red Astrachan, Anis, Talman Sweet, McMahan White, Red Anis, Swayzie Pomme Gris, Fameuse and Beautiful Arcad.

A number of crosses have also been made on another wild form of Siberian Crab *Pyrus prunifolia* which produces fruit naturally of nearly double the size of *Pyrus baccata*, and its hardiness has been established by tests of several years at both of the North-west experimental farms. The first crosses were made on this species in 1896, and the seed germinated in the spring of 1897. The young trees grown that year were planted out in orchard in the spring of 1898 where most of them are growing well. The number of these crosses are about 200 and pollen was used for crossing from the following cultivated fruits: Red Astrachan, Duchess, McMahan White, Simbirsk, Herren, Pewaukee, Haas, Golden Russet and Winter St. Lawrence. The extra size of the natural fruit of *Pyrus prunifolia* will, it it hoped, result in the production of cross-bred fruits of larger size.

The result here reported are but the first steps in a series of experiments which are full of interest, and promise to be of much value to the settlers over large areas in the Dominion. The seeds obtained from the most promising of these crossbred sorts are being preserved and sown and from them many interesting sports may be looked for. Now, that the continuity of nature has been broken by the work of cross-fertilizing it is proposed to carry on selection with seedlings of these crosses from which fruits of increased size and improved quality will probably be obtained. From these sources it is expected that within a few years a number of useful sorts of apples will be had, ripening at different periods which will endure the climate in most of the settled parts of the north-west country.

Last year I ventured to say that no success had been had in growing the larger fruits there in the Northwest, such as apples. During the past year, however, you will have noticed paragraphs announcing the fact of the ripening of numbers of apples of Russian varieties at different points in Manitoba, and this seemed quite contrary to the statements which I made to you last year. I took pains when in Manitoba this year to investigate this unusual condition of things. I visited Mr. Stevenson, who has had most success. His farm is at Nelson, six miles from Morden in the southern part of Manitoba, and he is at an elevation of about 700 feet above the sea, and in an exceptionally sheltered spot. He had ten or a dozen small apple trees, the trunks of which would probably measure four or five inches in diameter and standing ten or twelve feet high, on which there were a good many specimens of well-known Russian varieties of apples. It is the most successful year he has ever had, but his place is sheltered by a dense mass of wood on two sides, preventing any cold winds from reaching him, and his orchard itself is grown up. The trees are planted between every two or three rows of trees. There is a row of evergreens that are nearly as tall as the trees, so that in order to see the trees you have got to get right in amongst them they are so much sheltered. Mr. Stevenson remarked to me, " I know I have succeeded in growing apples here better, perhaps, than anybody else in Manitoba, but I doubt if anybody outside my own place, unless he had equally good conditions, could get the same results as I have got." When I arrived at Brandon I found

some very nice samples of apples which the Archbishop of Rupert's Land had sent up from Winnipeg, and he gave the details of how many apples he had to each tree, varying from 5 to 55 apples on the tree. This surprised me very much, but on my return I spent a day in Winnipeg to see how it was that apples had been so successfully grown at this point. On visiting the Archbishop's garden I found it also on the banks of the Red River, very exceptionally sheltered with woods on the north and west sides. It also was enclosed with a high board fence and when I came to examine the trees, I found that the fruit had all been borne below the snow line—that is, that the wood all above the snow line had been killed, and the apples had all been matured within about three feet of the ground. The trees had made a rapid new growth above where the fruit had been, but the results satisfied me notwithstanding fruit had been grown there and ripened under those exceptional conditions, that as a general thing people could not grow these varieties of apples under ordinary conditions of exposure. I thought this statement was needed in view of the statement I made last year, and which seemed to be contradicted by the reports in the newspapers.

Mr. CASTON: Were those dwarf trees?

Mr. SAUNDERS: They were dwarf, but I do not think they were what we call dwarfs. They were dwarfed by the weather. We have had similar experience to that in Brandon, as far as dwarfing the trees is concerned, but we have not matured any fruit on the trees. Every year for ten years they have been killed down to within two or three feet of the ground. In this case of the Archbishop's the tree had carried the buds through and matured the fruit the following year, but all the fruit buds were below the snow line, and the high board fence would help to collect the snow. There would have been three or four feet of snow in that garden in the winter; and practically it does not do away or lead one to modify the general statement that such fruits cannot be grown in that country under ordinary conditions. The further remarks I wanted to make relate to the new hybrid fruits suitable for growing in the North-West. I have still one more cross to bring to your notice, and that is the cross between the Sand Cherry and one of the wild American plums known as Colonel Wilder. The Sand Cherry most of you know well, and you will observe that this fruit, which is intermediate in the character of its foliage between the Sand Cherry and the plum, is also intermediate in size between those two fruits. The quality of the hybrid is much better than the Sand Cherry, and it may possibly be a useful fruit for the North-West. At any rate it is interesting as a scientific development of the work of cross-fertilizing, and I believe it is likely to stand the climate of the country and be useful to the people. (Applause.)

Mr. SHEPPARD: You mentioned that in the Archbishop's garden the fruit is borne upon the lower branches that were covered with snow. Has any attempt been made, such as Mr. Smart in New Brunswick carried on for many years with plums there? He raised plums, and laid the trees down over winter—cut the roots on one side and then laid them down and fastened the trees to the ground, and they were covered with snow the whole winter. In that way he preserved the fruit buds and raised large crops of plums. Has that ever been tried in Manitoba on the apples?

Dr. SAUNDERS: Not that I know of anywhere. The orchard of Mr. Stevenson is the only orchard I have seen where fruit has been borne above the snow line, and that success is no doubt attributable to the remarkable shelter which he has. I remember visiting Peter Gideon, lately deceased, several years ago. His orchard is on Lake Montaunk, not a very long way south of Brandon, and I saw some peaches there which he had succeeded in raising by adopting that method. He pulled me one off to try, and I had a chance to eat it while I was there, and it was a very well-ripened and good-flavored peach which he had succeeded in producing by adopting that plan; but we have never tried the experiment on

any of our North-West farms, for the reason that not many of the trees we ever planted there have lived more than one season, and there has not been the opportunity of carrying out experiments of that nature—generally been killed out root and branch. It is necessary to have these roots perfectly hardy. For that reason we have raised no stocks from the Pyrus Baccata seed.

MANITOBA AND THE NORTH-WEST TERRITORIES AS MARKETS FOR ONTARIO FRUITS.

Dr. Wm. SAUNDERS, director of the experimental farms, addressed the Association on this subject. In 1888 he first brought this topic before the fruit growers of Ontario in a paper which was presented at the annual meeting of the Association held at St. Catharines in December of that year. In that paper many facts were presented bearing on the extent and promise of the western market for the surplus fruits of Ontario. With a considerable and steady increasing population spread over an area of 1,000 miles in length and from 200 to 300 miles in width, with a number of well established cities and towns and with many new towns and villages springing up all over this vast district, the consumption of fruit is already very large and is increasing with amazing rapidity. Suggestions were made in that paper as to methods of packing and handling of fruit so that it might reach its destination in good condition, and if this could be accomplished a growing demand for Ontario fruits would follow.

Dr. Saunders then referred to what he had seen during his journeys through the north-west country this year and spoke of the improved condition in which Ontario fruit had reached that distant part of our country. He found in all the places he visited abundant supplies of Ontario grapes which were largely taking the place of the California product, hitherto the chief supply. These eastern grapes had reached the market in good condition, were keeping well, and were selling in large quantities at reasonable prices as compared with the past, but still at such figures as would give fair profits to the growers and the dealers. Ontario apples were also well distributed and some fine cases of Ontario grown pears were seen in some of the larger towns. The dealers all spoke well of the fruit, it had in most cases reached them direct in car load lots in excellent condition. On enquiring he learned that over 200 car loads of Ontario's surplus in this line had found a ready sale in the far west during the season and the market was not by any means glutted. With such material to dispose of, much of which is very perishable, he advised that Ontario shippers make business connections with the dealers in different towns and ship direct to them in carefully packed refrigerated cars as often as required. Fruit so supplied can as a rule be offered to the consumer in much better condition than if shipped to one or two business centres and thence distributed. The less such perishable material as fruit is handled and the shorter the time occupied in transporting it from the grower to the consumer the more profitable and satisfactory will this important business become.

HOW CAN WE PREVENT TRICKERY IN PACKING OF APPLES FOR EXPORT?

A. H. PETTIT: We have considered this matter for a time, and we would adopt the suggestion given us by Prof. Robertson, but the details of the scheme is something that we should not hurriedly put through. However, we think for

this meeting the suggestions made by Mr. Robertson this morning might be fully and thoroughly discussed, and the committee later on, after hearing the full discussion on the suggestions made, would probably be in a position to make a report that would be of value to this Association. There is one point in which we do differ for the present in regard to Mr. Robertson's suggestion, and that was that it would be unfair to place the grower's name upon the package over which he has no control. (Hear, hear.) The packer's and the shipper's name might fairly be put there, but not that of the grower who sold his fruit to the shipper and placed it outside of his control, as to the condition and quality of fruit contained in the package.

Mr. TWEEDLE: There would be another difficulty right along that line. One of the details of it is that a great deal of fruit is sent away to the warehouse and repacked. I do not see how the owner could be responsible for anything after that.

The PRESIDENT: As I understood Prof. Robertson, the grower was not responsible at all. His name was there merely as a matter of reference, but no responsibility attached to it whatever.

Mr. PETTIT: A great many Canadian growers have a very good name in the British market, and if the shipper was to put the grower's name on it when he had no control of the package, it might ruin his good name in the British market; therefore he must be protected in some way.

E. D. SMITH: In discussing this in the few minutes we had at our disposal at noon in the committee we felt the suggestions of Prof. Robertson were on the right line, and had struck a solution of the difficulty we had never been able to reach before. It had been suggested in other years that a grade of a certain size, say $2\frac{1}{2}$ inch apple, should be regarded as No. 1, and a $2\frac{1}{4}$ inch apple as No. 2, or something like that, and we felt that that would not meet the difficulty—that we could hardly specify what would be regarded as the size of a No. 1 apple. That difficulty was met with that suggestion to-day, that the minimum size be marked on the head of the barrel. A man might put up whatever he liked, but it must be marked on the head, with an allowance, as he suggested, of ten per cent., which I think would be very reasonable. That part the committee quite agree with. Then they suggested that the grade marks for quality should be Fancy, A1, No. 1 and No. 2—making four grades. That is a matter subject for discussion here. But one thing that we did not attempt to discuss, and felt it would take a good deal of time, is the matter of compulsion—whether everybody should be compelled, who put up their apples in this country, to put their marks on them, or whether it should be optional, that was a matter we could not come to a conclusion upon, for the reason that we should like to hear this matter discussed at this meeting, and give us leave to sit again and report at some future date.

Mr. HUGGARD: I think it is absolutely necessary to have a guide as to what is a No. 1 apple. I understand this committee was appointed for the purpose of designating what would be No. 1, No. 2, etc., acceptable to the Government and to purchasers. In the Toronto fruit market you will see all manner of fruit marked No. 1, when I would call them No. 3 or No. 4, and in some instances something like these in our baskets here, that are not even fit for a cider mill. The very fanciest varieties you have got I would call No. 1, and I should designate apples nearly as large, not so highly colored, with no spots, no worms, no rot, no bruises, all perfectly sound as No. 2.

A. H. PETTIT: As a basis for this, suppose we say that an apple that should rank A No. 1 should be an apple of fair size of the variety it represents, free from scab, worm hole and bruises, and properly packed. Now, I would ask you what size you would put a Baldwin to come under that head? Would you put a $2\frac{1}{2}$ inches, $2\frac{3}{4}$ inches? These are the little detailed points that we want to first con-

sider before we submit a report as to what will constitute these different grades, taking the various kinds. You come to the Kings, and where will your A 1 be there? Will it be 3 inches or 3¾ inches? These points all want to be carefully considered before submitting the standard to the Association for approval; and you may go on down to the various grades of apples in that way. It would be well if we could adopt a scale and have them stamped on the barrel; and we want your views on the variety and how they would range.

Mr. HUGGARD: I would submit that an A No. 1 extra quality of Baldwin should not be less than 2¾ inches; a King should not be less than 3 inches, neither should a Spy. These would be extra, and colored accordingly. Now, a Spy of three inches in diameter that is all green in color I would not rank as an A No. 1 apple, though perfect in every other way. The color has everything to do with Snows, Kings, Baldwins and all those colored apples. Take a barrel of Spys that there are very few red ones in, and you will not get a very high figure for them. We often see those barrels opened up in Toronto, Montreal and in our local markets, with apples all the way from 1½ inches up to 3½ inches in the same barrel. This barrel could not be graded anything, and it would not sell for very much supposing the apples were all sound, which they are not generally; but take the largest and most highly colored out of those apples and make a grade of them, and take the next and make a grade of them, and throw the smallest ones out altogether, then the buyer and seller would know just what they were worth. If I were a law-maker I certainly would make it criminal for any one to forward such apples as that to any country, or even to our own private market. A baker the other day in our own town came in with his bread wagon to sell bread, and it was reported to the chief constable that the bread was light. He went and tested some 30 or 40 loaves, and the poor of the town had the benefit of the bread at the expense of the baker. If a producer will not put the goods on the market at the price that he has a right to ask, have a standard whereby, both producer and consumer can prove as to its merits.

Mr. BOULTER: While we have a good name for apples in the Old Country it behooves us to see that the packing is carefully watched. We can produce the best apples in the world. The business men down near the Annapolis valley want Ontario Spys and Baldwins. I have always believed that inspectors would remedy the present evils we have to meet. The law in canned goods is that if the name of the packer is not on the package he is liable to pay $2 for every can so put up. $24 for a little case of goods is a pretty serious thing. We have followed that up and punished men for violation of the law. It is the same thing with apples. My theory is to start this thing right. I do not think it is wise policy for a large fruit grower to be a speculator in it. I think you have got started to-day pretty near on the right basis. Prof. Robertson has outlined something from his long experience that is of value. I believe that whoever sells an apple, who is responsible for the sale, as I am for my goods, his name must be there imperatively, and it ought to a statutory law that if he sends goods out of Canada or sells goods in Canada, his name ought to be there as a guaranty of good faith, not put a fictitious brand of any kind. Make the man responsible that puts the article up. Throw the responsibility on him, and make him liable to lose his fruit. If you send a car of goods to British Columbia and they find one barrel infected with worms, they will burn that whole car before your eyes. I was buying peaches in Toronto for three years, and I came to the conclusion there was not an honest peach packer in Canada. (Laughter). I would not like to say that about the peach packer only; I would like to say he had friends among the apple growers.

The PRESIDENT: I am satisfied this committee now will be able to bring in a report.

REPORT OF COMMITTEE ON FRUIT PULP.

By W. Boulter, Picton.

You appointed a committee last year to take into consideration the shipping of our surplus fruit pulp to the old country. I had connected with me Rev. A. J. Andrewes and Mr. Alex. McNeill. I had shipped over some samples last year. In April I went over to England, and the parties who had been writing in regard to this fruit pulp were my own brokers in London, Messrs. Anderson & Coulton, I interviewed them in regard to it. I sent the letter over to our worthy secretary. I am not going to read that letter to you. The question was whether our raspberries could be successfully made into pulp and shipped over. We are not able to make jam in Canada and compete with the Englishmen. The idea is for him to get fruit, as he does, that does not cost him more than 5, 6 or 7 cents a pound. He wants to put as much sugar in it as he possibly can, because he buys the sugar for 1½ d. a pound, and the more sugar he puts in the more profit he makes out of that pulp. I had a talk with my brokers, who had first introduced this subject, and I came to the conclusion it was rather precarious business. However, I came home about the first of June. When I left London the season had not been very favorable, a little too dry; the crop of raspberries was not likely to be very large. I wrote Mr McNeill that I was ready to go on and put up the goods; but I received no reply. I wrote again and received no reply. Mr. McNeill apologised to me that he did not write, and I said, "Well, perhaps you did'nt because under the circumstances you thought the crop was going to be so light that it would not do to make any sacrifices and put it into pulp; you would make more money the way it was." That is about the sum and substance of the business this year; the crop was not so large that there would be any advantage to put it up and ship it to the old country. You heard Prof. Robertson say last year that if certain prices could not be realised there would not be much result. However, I came home and bought up a lot of the Shaffer raspberry. It is not a real good salable raspberry in Canada along side of the Cuthbert, but it makes splendid good pulp, it is good color. I put up fourteen tons of these raspberries into pulp, under the ordinary process, in gallon cans, the same as the gallon apples that you see exposed for sale. The brokers had written me that taking all things into consideration that was the most desirable package to send over. I sent samples of the goods over. The quotation Prof. Robertson gave you was from £20 to £30 per ton of 2240 lbs. The letter I received from the brokers says that the ordinary prices range from £18 to £20 per ton of 2240 lbs., and it was not till something like a week after that it jumped up to £40, sometimes to £50. Well, if we could get £40 a ton a little money would result to the grower of these berries at five cents a quart. However, there have been no such prices as that since we put up the goods. I wrote to Hon. Mr. Fisher, and he said as soon as Prof. Robertson got back he would correspond with me and see what could be done. In conversation with Prof. Robertson to-day he wished me to send over a ton to be distributed among the large buyers. I made the proposition to you to send your raspberries to me and I would put them up at actual cost. It would not have paid you this year to have done it, even to have sent them a mile or two miles from your place of growth, because if you can realise five cents a quart, don't take any chances of putting them up into pulp. It will not pay as the expenses in connection with it are so great and the chances and competition with the Australian, the French, and pulp from other countries naturally keeps the price low. I am holding these goods back simply because we could not get freight space at a reasonable price. The prices in January are likely to be better than they are now, and I shall report the actual result later on. I shall go on and put up goods even next year. Some

goods have been put up and sold for 25 shillings a dozen. The easy way to put these goods up would be in gallon cans, 7 lbs. to the can, which would mean 84 lbs. to the dozen, and the quotation of 26 shillings which I was offered would be for a dozen of those cans—not by the ton. Taking the shilling at 24 cents. the cost, as near as I can make it up, comes to about $4.80—you can be very safe on that—5 cents per pound. The cans and the cases and the ordinary processing and freight would cost at least 2 cents more, which would make 7 cents laid down; so you can easily figure that 26 shillings for 84 pounds would leave very little money. I will say in conclusion that should the crop of raspberries be large next year, and the prices drop, I will do my best to take your surplus stock at a price that will pay you a good deal better than throwing it away. Perhaps some other packer is willing to invest as I have been.

Mr. SERVOS: Could the raspberries be evaporated and then sent to the Old Country and placed on the market there and answer the purpose of pulp?

Mr. BOULTER: No.

Mr. SERVOS: What would be the best course to pursue in order to realise?

Mr. BOULTER: The old-fashioned way was evaporation, or drying naturally. At present I do not know any other way unless you can get somebody who can put them up in these cans in the natural state. They must be sweet when they are put up. You could not make an article strong enough to hold it if it went into fermentation crossing the ocean.

Mr. SERVOS: Would it not be possible to employ some person to come right on the premises and do the work?

Mr. BOULTER: If you had a large quantity.

Mr. SERVOS: Would twenty acres be enough,

Mr. BOULTER: Oh, yes; five acres would be sufficient. What variety are you speaking of?

Mr. SERVOS: These are wild raspberries.

Mr. BOULTER: Yes, that would be a good point. They would make good jam, but you could not get pickers. I tried this. You could not get pickers to pick wild raspberries so that you could make any money and put them up. If you got beyond 4 or 5 cents a quart you could not make any money at the prices I quoted you. If you can sell them at the home market, sell them, if you can get 4 cents a quart nett, do not attempt to do anything else only sell them.

Mr. SERVOS: I had everyone of them sold in Toronto this year but could not get pickers.

Mr. BOULTER: You could not make any money with picking at that price.

Mr. SERVOS: What is a pound equivalent to?

Mr. BOULTER: A pound is an imperial quart.

Mr. SERVOS: They wanted three cents a pound.

Mr. BOULTER: They wanted all there was in it.

After some discussion it was decided that the committee appointed to report on the suggestions of Prof. Robertson be authorized to confer with that gentleman and take such action in the matter as circumstances might require.

MUSHROOMS.

By Rev. Dr. Hare, Principal of Whitby Ladies' College.

Mushrooms are a kind of fruit that are not very well known even by fruit growers, and I may tell you that we had baskets full of these mushrooms that were really palatable and nutritious—more nutritious than any kind of fruit that you grow in your orchard—and these were simply wasted, thrown away, because we did not understand that they were edible and nutritious. When you come to

know that mushrooms rank next to meat in nutritive qualities, that they are even more nutritious than peas or beans, then you come to understand that they are an article of diet that we should not despise. The kind of mushrooms that grow in our college grounds are three. There is the common Meadow mushroom that you are all acquainted with. Then there is the larger and coarser mushroom, but very much like it, known as the Horse mushroom. That was found in considerable quantity around our college hot bed. Then there is what is known as the Fairy Ring mushroom. This was rather troublesome in our lawn grass. The grass grew quite green amidst the mushrooms, and it rather spoiled the general appearance of the lawn, and we were doing all in our power to exterminate these mushrooms. I gave instructions to the man to go and destroy them the moment they put their heads above the soil. Now we are glad to see them there, and we go and pick them up, and we find them very nutritious and palatable eating. Then I may say there are two other mushrooms found within the corporation that are really valuable. One is the *Cobrinus commodus*. Some are very much afraid of this simply because it turns to ink when it decomposes. You will find a quantity of that peculiar species in this neighborhood. They are quite plentiful this autumn. They look, when closed, like an umbrella closed, and then when they open out they are somewhat bell-shaped, or like an umbrella somewhat open, and they are rather light colored on the outside, a little dark at the top of the cap, and the cuticle rather splits up into shaggy scales, and it gets the name Shaggy mushroom. The gills are white at the outside, then they begin to turn pink at the edges. It next turns black and begins to decompose, and then it just simply turns into ink and disappears. Then we have in Dr. Waugh's grounds a very fine species of Morell. This mushroom is not known because it is not a gill-bearing mushroom. It looks like a honey-comb on the outside and the spears are developed on the outside of the mushroom instead of beneath the cap on the gills. I may say that in the township of Oro in the county of Simcoe the Morell is very much prized. Dr. Waugh was teaching there some years ago, and he was telling me that it resembled in taste a very tender leg of chicken, somewhat midway between the taste of a chicken and the taste of very delicate lamb. Now, when you find that the percentage of proteids or albuminous matter that may go to build up the system is exceptionally large in these Morells, and that they are such delicious eating, certainly we ought to be able to recognize such friends of ours when we see them. Then I may say that there are no less than four different species of puff-balls found in the college grounds. Some people are afraid of them. Now, there is not a single poisonous puff-ball known to science. All these puff-balls are good to eat if we get them when they are young and white in the centre. If they begin to turn yellow and there are streaks through them, then they are not fit to eat. There is one little puff-ball known as the Calpsin puff-ball; then there is another called the Warty puff-ball that is very common in our college grounds, sometimes three or four together, quite warty on the outside. They are more compact in structure than the first one I have referred to. Then there is a pear-shaped puff-ball and out at Tweedie's woods there are two very fine species of puff-ball known as the Albertum and also the Gigantum Zendiform, that is the January puff-ball. I have in the college museum a sample of the January puff-ball that must have been much over a foot or a foot and a half in diameter. These puff-balls are delicious eating. I have had the pleasure of eating some of them, and thoroughly enjoyed them, and where we could find access to one of these large puff-balls we can simply cut a slice off the upper part of it and serve it for dinner to-day, and then wait and come along the next day and cut off another slice, and the puff-ball will continue to grow, and unless we are very extravagent in our ideas it may continue there for some days and afford us delicious eating. If I had time I would like very much to go into the classification of puff-balls, their structure, their life-history, and

then perhaps to make some drawings that would illustrate what I had to say. I thank you very heartily for the privilege of making these remarks, and I hope that those of you who do find puff-balls in your neighborhood will become enthusiastic. I do not profess to be an expert, but I say this, that I have unbounded interest in the subject, and that the more I learn respecting mushrooms the more enthusiastic I become.

The PRESIDENT: I am satisfied there is no article this country produces so edible as mushrooms. I am very glad the Doctor brought that question up.

PREPARATIONS FOR A DISPLAY OF CANADIAN FRUITS AT THE PARIS EXPOSITION.

BY PROF. SAUNDERS, DIRECTOR EXPERIMENTAL FARM, OTTAWA.

In planning for a representative exhibit of Canadian fruits at the Paris Exposition in 1900 it was necessary to consider the subject from several standpoints. The time of holding the Exposition, from the 5th of April to the 30th October, has an important bearing on the material to be exhibited. The first point to consider was what fruits could be shown in a natural condition within the time named, and how they could best be preserved so as to maintain a continuous exhibit. In this connection, also, it was necessary to consider how the softer and more perishable sorts of fruit could be kept so as to show them of their natural size, form and color.

It was decided to undertake the preservation of the perishable fruits in antiseptic fluids and to secure some of the best specimens of these products from all the more important fruit-growing sections in the Dominion. To this end there have been filled in all more than 1,700 jars. These containers are of various sizes, from one pint to five gallons each, are made of the clearest and finest glass so as to show the fruits off to the greatest advantage.

Of these glass jars 794 have been filled with fruits grown in Ontario; 402 with those of Quebec; 258 from Nova Scotia; a few from New Brunswick, and 28 from Prince Edward Island. Forty-eight have been filled with cultivated small fruits and wild fruits of Manitoba and 31 with those of the North-west Territories, while 188 jars have been received from British Columbia. The following preservative solutions have been used: 1st. A two per cent solution of Formalin in water for strawberries, some of the red raspberries, blackberries and red currants; 2nd. A two per cent. solution of boracic acid for cherries, red and black currants, gooseberries and some varieties of raspberries, also red and black grapes, plums and apples; 3rd. A three per cent. solution of chloride of zinc. which has been found very useful in preserving white currants, white raspberries, and green and russet apples; 4th. A solution of sulphurous acid made by mixing one pint of commercial sulphurous acid with eight pints of water, which has proved an excellent preservative for all light colored fruits. To all these watery solutions ten per cent. of alcohol has been added to prevent danger of freezing during transportation.

The collection of fruits preserved in fluids consists of the following: Strawberries, 137; red, white and black raspberries, 203; blackberries, 27; red and white currants, 177; black currants, 13; gooseberries, 121; cranberries, 9; plums, 208; peaches, 30; quinces, 3; apricots, 2; cherries, 85; grapes, 108; pears, 122. and apples, 455. Most of these latter are early maturing sorts. Additional jars of the later maturing fruits will be filled in Paris from the fine selection sent there to be shown in a fresh condition.

In making selections of fresh fruits, which are being preserved in cold storage n Montreal until the time for exhibiting them arrives, it was decided that the

display in this section should be confined to apples and pears and that our commercial varieties should be made the most prominent feature. It was, however, thought best, in order to more fully illustrate the capabilities of the different climates of Canada, and at the same time make the exhibit more interesting and attractive, that a considerable number of varieties should be secured; but no attempt has been made to preserve any variety earlier in season than the Fameuse. From that period onward, selections have been made of all the most desirable apples and pears which could be obtained. The fresh fruit has all been packed in bushel boxes, the Cochrane case, with a separate paper compartment for each specimen, having been chosen for this purpose. The fresh fruits have been secured from the different provinces as follows:—Ontario, 96 boxes, and nine to follow, Quebec, 130 boxes; Nova Scotia, 83 boxes; New Brunswick, 50 boxes; Prince Edward Island, 24 boxes; and from British Columbia, 68 boxes, making 451 boxes in all, which will probably be increased to about 500 when all the fruits selected are in.

Those received are now in cold storage in Montreal, from whence they will be forwarded in good season to Paris, using, if necessary, cold storage in transportation and placing them in cold storage on arrival there, and taking them out of cold storage from time to time as required for the display. In this way it is hoped that an attractive exhibit of fresh fruit will be provided, giving prominence to all our late keeping winter varieties for two or three months after the Exposition is opened. As the specimens shown cease to be useful for the fresh fruit exhibit, samples will be put in glass jars in antiseptic fluids, so as to add to that portion of the display.

In getting this large and comprehensive collection together, the following gentlemen have rendered excellent service: Mr. A. McD. Allan, of Goderich, Ont., who has had charge of the work for Ontario; Prof. H. L. Hutt, of the Ontario Agricultural College, Guelph, who has undertaken the work of preserving the more perishable fruits brought together by Mr. Allan, and has put up 596 jars; Mr. W. T. Macoun, horticulturist of the Central Experimental Farm, who has put up 161 bottles, containing samples of the fruits grown on the Central Farm; Mr. R. B. Whyte, of Ottawa, who has contributed a nice collection of early fruits from his own garden, numbering 17 specimens; Mr. Robt. Hamilton, of Grenville, Que., who has collected all the fresh fruits from Quebec and put 230 samples in preserving fluids of fruits grown in the western part of that Province; Mr. Albert D. Verreault, of Village des Aulnaies, Que., who has bottled 205 samples, representing the eastern sections of Quebec; Mr. J. W. Bigelow, President of the Fruit Growers' Association of Nova Scotia, Wolfville, has brought together the larger part of the fresh fruit collected in that Province; Mr. C. A. Patriquin, of Wolfville, who has assisted Mr. Bigelow in collecting the fresh fruit and has conducted the work of preserving 89 of the more perishable sorts in fluids; Mr. Thos. A. Peters, of Fredericton, Deputy Commissioner of Agriculture for New Brunswick, who has undertaken the work in that Province; and Mr. J. S. Clark, who has made the collections for Prince Edward Island. Such small fruits as can be grown successfully in Manitoba have been collected by Mr. S. A. Bedford, superintendent of the Experimental Farm at Brandon, who has contributed 48 specimens, and similar work for the Northwest Territories has been done by Mr. A. McKay, superintendent of the Experimental Farm at Indian Head, who has sent 31 sample jars. In British Columbia Mr. J. R. Anderson, Secretary of Agriculture, Victoria, has done excellent work in collecting fresh fruit from the more important fruit growing districts of that province; while Mr. Thos. A. Sharpe, superintendent, has forwarded a good collection of fresh fruit from the Experimental Farm at Agassiz, and has also put up in preserving fluids 188 jars of the more perishable and early ripening fruits grown on the Experimental Farm for British Columbia.

A good location for the display of Canadian fruits has been secured in the Imperial space in the main building devoted to horticulture, where Canadian fruits will be placed side by side with those from other fruit producing countries. A further display will be made in a suitable space provided in the Canadian building. It is also proposed that examples of the early ripening Canadian fruits of the growth of 1900 be sent to Paris in cold storage in August and September of that year, so that a good impression may be made with fresh Canadian products during the closing weeks of the exhibition. It is believed that Canada will make an excellent showing on this occasion, which will demonstrate to the world her capabilities as a fruit-growing country, and, with the evidence submitted by this exhibit drawn from fruit-growing areas from the Atlantic to the Pacific, convincing testimony will be afforded of the suitability of the Canadian climates for producing fruits of the most attractive character and of the highest flavor.

GOOD ROADS FOR FRUIT GROWERS.

Mr. A. W. CAMPBELL, Government Instructor in Roadmaking, Toronto, delivered an interesting address upon the subject of good roads, and urged the appointment of a committee to assist in the work of road improvement.

The SECRETARY: I think perhaps it might be wise for us to appoint a committee on Good Roads, as was suggested by Mr. Campbell. I am sure that we, as fruit growers, are as anxious that we should have good roads throughout our country as any others in the Province. I would move the following Committee on Good Roads, and if they could form any resolution to send in to the Minister of Agriculture, it would be a good move in this direction:—E. Lick, Whitby; G. C. Caston, Craighurst; Harold Jones, Maitland.

Mr. HUGGARD seconded the motion, which was carried unanimously.

VOTES OF THANKS.

Your Committee on Resolutions beg leave to further report—

That it be resolved, that a hearty vote of thanks be tendered to the mayor and corporation of the town of Whitby for the use of the Music Hall for the annual session of the Ontario Fruit Growers' Association; also to the following persons, Misses Mitchell, Perley, Crysdale and Yorke, for their valuable services in furnishing music for the evening sessions; also to Dr. Saunders, Prof. Macoun, Prof. Hutt and Prof. Robertson for their valuable papers and addresses; also to the several persons who contributed exhibits of fruit.

Finally, that the sympathy of the Association be conveyed by the Secretary to Messrs. T. H. Race and A. M. Smith in the illness that has prevented their attendance at this meeting.

THE MANCHESTER SHIP CANAL.

Mr. R. DAWSON HARLING, of Toronto, then gave a lecture on the Manchester Ship Canal, illustrated by stereopticon views, Mr. Maughan working the instrument. Mr. Harling said his subject was a continuation of that spoken of so well by Mr. Campbell this evening—that of transportation. By means of that marvelous piece of engineering work, the Manchester Ship Canal, Manchester stands in relation to the transportation question as a seaport like Liverpool, though it is thirty-five miles inland. The Manchester canal, though one of the wonders of this century, was mooted—in relation to sailing vessels—over a hundred years ago; but, if it had been built then, it is certain it would not have accommodated the

steamships of the present day. The present canal is capable of carrying the largest cargo boats of to-day, steamers capable of carrying up to 9,000 gross tons. The canal runs from the Mersey, near Liverpool, right through the heart of the country. The canal was built in spite of tremendous opposition from the harbour companies, of enormous capital, and from various railroad companies. The bill was thrown out of Parliament three times; and even when it passed, the canal was built through opposition inch by inch from landholders and others. Why was the canal necessary? About the year 1875 competition became so keen that it was almost unprofitable to manufacture cotton, and in most cases the mills were closed down. This continued for five or six years; and if the decadence went on for ten or fifteen years, there would have been no city of Manchester so far as the cotton trade was concerned, and to the enormous population which surrounded the city the matter was serious. A commission was appointed to investigate, and they reported that the cause of the whole trouble was the excessive charges upon their foreign raw materials at the port of debarkation, and for bringing those materials from the sea coast to Manchester. The only solution was to be found in the building of light railways from Liverpool to Manchester, or to build the canal. The railways had taken up all the attention and nearly all the capital; but the canal came to the front, with Daniel Buchanan as the prime mover. Five years ago last January it was opened. The great increase in the size of ships a year or two after the opening gave rise to predictions of failure, but these were soon dispelled. One of the chief factors in transportation is to have your produce carried to the consumer in the most direct way and in the cheapest way. The Canal Company made up their minds that a canal without a steamship line would be of very little use; so the steamship company was formed in the opening of 1898, with a million pounds sterling capital, called the "Manchester Liners, Limited," and they decided that their first trade should be exclusively between Canada and Manchester. They began by buying two boats —the Manchester "Enterprise," which foundered in the Atlantic week before last, and the Manchester "Trader." Then they put on the stocks seven new boats, that are some of the finest going out from Canadian ports. They run from 7,000 to 9,000 tons dead weight, and are fitted with cold storage and every possible means for carrying perishable products over and landing them on the other side in the best possible condition.

The Secretary moved a hearty vote of thanks to Mr. Harling for his kindness in giving us the address and bringing the beautiful views before us. The motion was carried unanimously amid applause.

Mayor RUTLEDGE: I have great pleasure in moving a hearty vote of thanks to the President and Secretary, and to the various members of the Association, and the gentlemen who have been present with us in the past two evenings, for their very great kindness in visiting the town, and for giving us the mass of excellent information which they have. I feel that the town and this part of the country will be forever indebted to the Fruit Growers' Association of this Province for their very great kindness in these ways.

Mr. HUGGARD: I rise to second this motion with the greatest possible pleasure, and I am quite sure that every citizen of the town of Whitby will endorse it very heartily. It is five years since the question was asked, "Will you come here to make us a visit?" You promised to do so, and you have kept your promise faithfully and well; and such a mass of information has not been given to any people for a long time.

The motion was carried amid applause.

THE SECRETARY, in acknowledging the vote, said: We have been delighted with the reception we have received in your town. Everywhere we go we have to become acquainted before we are understood. Some towns think we are bringing some show, and that we want to make money out of the affair, and it takes

some time to convince them that we are trying to be of public benefit, and to gather such information for our report as we can from the people who attend our meetings. We have gathered information from you, and appreciate all the kind words you have given us.

The Convention closed by singing the National Anthem.

LIST OF AFFILIATED HORTICULTURAL SOCIETIES.

Name.	*President.*	*Secretary.*	*No. of Members.*
Arnprior	Claude McLachlin	George E. Neilson	58
Belleville	W. C. Reid	W. Jeffers Diamond	70
Brampton	W. H. McFadden	Henry Roberts	95
Cardinal	Wm. Beddie	E. E. Gilbert	60
Carleton Place	A. H. Edwards	J. A. Goth	61
Chatham	Capt. Gordon Boles	Geo. Massey	109
Cobourg	J. D. Hayden	Major H. J. Snelgrove	87
Durham	Chris. Firth	Wm. Gorsline	103
Elmira	S. Laschinger	C. W. Schierholtz	55
Grimsby	L. Woolverton	E. H. Read	60
Guelph	James Goldie	Wm. Ross, Box 548	89
Hagersville	Wm. Harrison	S. W. Howard	81
Hamilton	A. Alexander	J. M. Dickson, 22 Bruce street	159
Hespeler	John Fisher	David Rife	57
Iroquois	W. A. Whitney	A. E. Overell	55
Kemptville	Angus Buchanan	T. K. Allen	52
Kincardine	S. W. Perry	Joseph Barker	94
Leamington	J. D. Fraser	E. J. M. Edelsten	..
Lindsay	W. M. Robson	F. J. Frampton	88
London	J. A. Balkwill	R. W. Rennie, Talbot street	60
Meaford	O. Boden	A. McK. Cameron	63
Midland	F. Cook	Miss M. Tully	51
Millbrook	Geo. Sootheran	W. S. Given	60
Mitchell	A. D. Smith, M.D.	T. H. Race	51
Napanee	Mrs. W. H. Wilkison	J. E. Herring	67
Niagara Falls	W P. Lyon	T. J. Robertson	56
Norwich	J. D. Hogarth	Wm. Fairley	50
Oakville	Wm. Savage	W. W. Paterson	118
Orangeville	John McLaren	Wm. Judge	80
Owen Sound		Jas. Vair	61
Paris	Paul S. Wickson	Gordon J. Smith	60
Picton	J. Roland Brown	W. T. Ross	78
Port Colborne	Rev. J. Smith	A. E. Augustine	56
Port Dover	Peter Lawson	W. J. Carpenter	80
Port Hope	H. H. Burnham	A. W. Pringle	118
Seaforth	Wm. Ballantyne	F. G. Neelin	73.
Simcoe	H. H. Groff	Henry Johnson	76
Smith's Falls	Dr. J. S. McCallum	W. M. Keith	109
St. Catharines	G. W. Hodgetts	Eph. Wismer	86
Stirling	Mrs. Jas. Boldrick	David Sager	51
Thornbury	John Mitchell	A. W. Walker	57
Toronto Junction	F. C. Colbeck	W. H. Post	52
Trenton	W. S. Jacques, M.D	S. J. Young	55
Waterloo	A. Weidenhammer	J. H. Winkler	151
Woodstock	D. W. Karn	J. S. Scarff	97
Windsor	Stephen Lusted	J. R. Martin	80

SIXTH ANNUAL REPORT

OF THE

ONTARIO FRUIT EXPERIMENT STATIONS

1899

To the Honorable John Dryden, Minister of Agriculture for Ontario :

Sir,—In submitting to you the Sixth Annual Report of the Ontario Fruit Experiment Stations, we desire to call your attention to the steadily increasing value of the matter contained therein. Your Board has to a large extent done away with tables and asked the experimenters to reduce their reports to paragraph notes, believing they will be more appreciated by the general reader. We also desire to call your attention to the results of an experimental shipment of Rogers' grapes, sent to Manchester under your instructions, which were sufficiently encouraging to lead us to count upon eventually opening up a good market in Great Britain for our best varieties.

We have the honor to be, Sir,

Your obedient servants,

James Mills, Chairman.
Linus Woolverton Secretary

BOARD OF CONTROL, 1900.

REPRESENTING THE COLLEGE.

JAMES MILLS, M.A., LL.D ..... Guelph.
H. L. HUTT, B.S.A. ..... Guelph.

REPRESENTING THE ONTARIO FRUIT GROWERS' ASSOCIATION, 1900.

A. M. SMITH ..... St. Catharines.
W. M. ORR ..... Fruitland.
WELLINGTON BOULTER ..... Picton.
LINUS WOOLVERTON, M.A. ..... Grimsby.

EXECUTIVE COMMITTEE.

Chairman—JAMES MILLS, M.A., LL.D.
Secretary—LINUS WOOLVERTON, M.A.
Official Visitor—Prof. H. L. HUTT, B.S.A.

THE ONTARIO FRUIT EXPERIMENT STATIONS.

	Name.	*Specialty.*	*Experimenter.*
1.	Southwestern	Peaches	W. W. HILBORN, Leamington.
2.	Niagara	Tender Fruits	* * * St. Catharines.
3.	Wentworth	Grapes	MURRAY PETTIT, Winona.
4.	Burlington	Blackberries and Currants	A. W. PEART, Freeman.
5.	Lake Huron	Raspberries and Commercial Apples	A. E. SHERRINGTON, Walkerton.
6.	Georgian Bay	Plums	J. G. MITCHELL, Clarksburg.
7.	Simcoe	Hardy Apples and Hardy Cherries	G. C. CASTON, Craighurst.
8.	East Central	Pears and Commercial Apples	R. L. HUGGARD, Whitby.
9.	Bay of Quinte	Apples	W. H. DEMPSEY. Trenton.
10	St. Lawrence	Hardy Plums and Hardy Pears	HAROLD JONES, Maitland.
11.	Strawberry sub-station		E. B. STEVENSON, Guelph.
12.	Gooseberry sub-station		STANLEY SPILLET, Nantyr.
13.	General collection of fruits for descriptive work including	Cherries	L. WOOLVERTON, Grimsby.
14.	Algoma	Hardy Fruits	CHAS. YOUNG, Richards Landing.
15.	Wabigoon	Hardy Fruits	A. E. ANNIS, Dryden.

FRUITS OF ONTARIO.

DESCRIBED AND ILLUSTRATED BY MR. L. WOOLVERTON, SECRETARY OF THE ONTARIO FRUIT EXPERIMENT STATIONS.

1899.

Fruit growing has become so important an industry in the Province of Ontario, that it deserves every encouragement at the hands of the Department of Agriculture. The Canadian farmer who contemplates growing fruit asks for information on two points in particular, viz., (1) What fruits shall I plant, and (2) how shall I cultivate them? The latter of these questions it is the province of the Ontario Fruit Growers' Association to answer through the Canadian Horticulturist and the Annual Report, while the former question is one that can be solved only by years of patient experimental work by our fruit experiment stations.

Of equal importance is some means of identifying all varieties now grown in our Province, and of knowing with some degree of exactness the size, color, general appearance and real value of these varieties aside from the catalogues of the nurserymen. To meet this latter need, the Secretary, with the advice and approval of the Board of Control, has begun the work of illustrating and describing the fruits of Ontario, and in this work he desires to acknowledge the valuable aid of the various fruit experimenters. The illustrations are all new and original, having been engraved from photographs made the exact size of the fruit samples, except where otherwise specified, and in this way there will in time be made accessible to the Ontario fruit growers a complete guide to all the fruit grown in the Province. Such a work necessarily must be slow and tedious, but it is all important that it should be characterized by scientific accuracy, and the writer invites notes or criticism from pomologists generally.

NOTE.—In the following pages an attempt has been made to use the words instead of figures to describe quality and value according to the following scales:—

Quality.—1. very poor; 2-3, poor; 4-5, fair; 6-7, good; 8-9, very good; 10, first class.
Market Value.—1-3, 4th rate; 4-6, 3rd rate; 7-8, 2nd rate; 9-10, 1st rate.

Exhibit at Industrial Fair, 1899.

CRANBERRY PIPPIN.

An apple that is worthy of being planted in Southern Ontario as a fancy variety for export. Though the quality is ordinary and not suitable for dessert, its extreme beauty when opened in mid-winter, its large and even size, usual freedom from blemishes and the productiveness of the tree every alternate year, make it a desirable variety.

At Maplehurst, Grimsby, in 1895, fifty trees of this variety, about twenty years planted, yielded 200 barrels of high grade apples, and in 1893, when other varieties were almost worthless, nearly the same quantity. Sometimes, however, this variety is subject to warts and knots, which mar its beauty.

SECTION OF CRANBERRY PIPPIN.

ORIGIN, accidental on a farm, near Hudson River, N. Y.

TREE, very vigorous, healthy, spreading, productive.

FRUIT, medium to large, roundish, oblate; skin, smooth, yellow shaded and striped with two shades of red; stem, slender, one one-eighth inches long in a deep cavity; calyx closed in a wide, wrinkled basin.

FLESH, white, firm, crisp, moderately juicy, sub-acid.

QUALITY, fair.

SEASON, November to February.

ADAPTATION, Southern portions of the Province, especially along the shores of the lakes.

CRANBERRY PIPPIN.

DUCHESS.

(*Oldenburg of Downing, Borovitsky of Royal Horticultural Society, 1824.*)

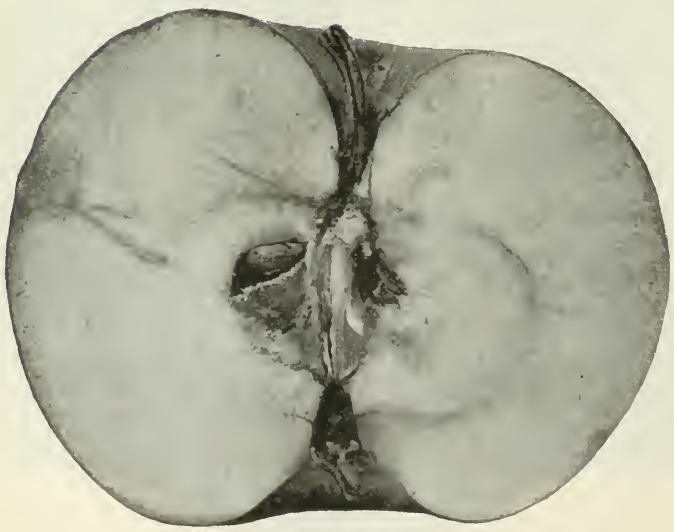
In cold storage, this apple may be profitably exported to Great Britain. It succeeds in every part of Ontario where the apple can be grown, and its beauty always brings for it the top price in the market.

ORIGIN, Taurida Gardens, St. Petersburg, Russia, in 1824 introduced into England by the Royal Horticultural Society in 1824.

TREE, very hardy, very vigorous and an early and abundant bearer.

FRUIT, large, two and one-half inches long by three inches wide ; form, regular roundish, oblate, one sided ; skin, greenish yellow, with bright red stripes, splashes and numerous russety dots ; stalk, slender, three-quarters of an inch long, set in a deep funnel-shaped cavity ; calyx, long, closed, in a deep broad plaited basin.

THE DUCHESS.



SECTION OF DUCHESS.

FLESH, greenish, turning yellowish white at maturity ; texture, fine firm and juicy ; flavor, brisk, refreshing acid.

SEASON, August and September.

QUALITY, dessert, fair, cooking good.

VALUE, first-class of its season for home market.

ADAPTATION, general. Succeeds fairly well even at our Algoma station, and does exceptionally well on the borders of lakes Ontario and Erie. In Quebec it is counted first in the list of apples for profit.

St. LAWRENCE.

A very good fall apple, of value as a commercial variety along the St. Lawrence river, because of the hardiness of the tree, and at one time widely planted throughout Ontario, but

St. Lawrence.

has now given place to more showy varieties such as Gravenstein, Blenheim and Wealthy.

Origin, Canada.

Tree, hardy, vigorous, fairly productive.

Fruit, medium to large in size, averaging about $2\frac{1}{2}$ x $3\frac{1}{4}$ inches; form, roundish, oblate, inclined to be a little conical; skin, light yellow with prominent stripes of bright red; stalk, slender, $\frac{3}{4}$ inch long, set in a deep regular cavity; calyx, closed, in a narrow deep basin.

Flesh, white, sometimes slightly stained, fine grained, crisp, tender, slightly juicy; flavor, fairly good and agreeable.

Season, September and October.

Quality, dessert, good; cooking good.

St. Lawrence.

Value, market, good.

Adaptation, general

SWEET BOUGH.

(Large Yellow Bough of Downing.)

An excellent dessert apple, ripening about the same season as the Early Harvest; not subject to scab, and a favorite with those who prefer a sweet to a sour apple. Not profitable to grow for market, but it deserves a place in every collection for home use. Baked whole it is delicious eaten with cream.

ORIGIN, United States.

TREE, of medium vigor, never attaining a large size, and, therefore, even with a full crop, not very productive. Bears full every alternate year; head, compact.

Fruit, large, ovate, conical; skin smooth, greenish yellow; stem one inch long, in a narrow, deep, regular cavity; calyx open, in a shallow, irregular basin.

FLESH, white, fine grained, tender and juicy; flavor moderately sweet, rich and agreeable.

Season, July 25 to August 10.

QUALITY, dessert very good; cooking poor, except for roasting.

SWEET BOUGH.

VALUE, home market, poor to good, foreign market, useless.

SECTION OF SWEET BOUGH.

ADAPTATION, succeeds well in Niagara district.

TITOVKA.

(*Titus apple.*)

A variety as yet little known or tested in Canada. In season it is about the same as the Duchess, which it somewhat resembles, except that it is oblong, while the former is roundish.

TITOVKA.

It is a favorite market apple in middle Russia and is found to endure the severest winters. At Grimsby, grown as a top graft, it is inclined to drop its fruit about the middle of August, and almost before fully colored. Probably a fine variety for export in cold storage, to succeed Duchess.

ORIGIN, Russia.

TREE, very hardy and productive.

FRUIT, large, $2\frac{3}{4}$x3 inches; roundish, often flattened at base and apex, somewhat irregular on sides; color, yellowish green, almost covered with stripes and shadings of bright red, and light green dots; cavity narrow, deep and irregular; stem about $\frac{3}{4}$ inch long, stout; basin, large, deep, plaited at bottom; calyx nearly closed, segments recurved.

FLESH, white; texture firm, moderately juicy; flavor brisk, tart, good.

SEASON, August 16 to 30.

QUALITY, dessert poor; cooking good.

SECTION OF TITOVKA.

VALUE, home market first-class.

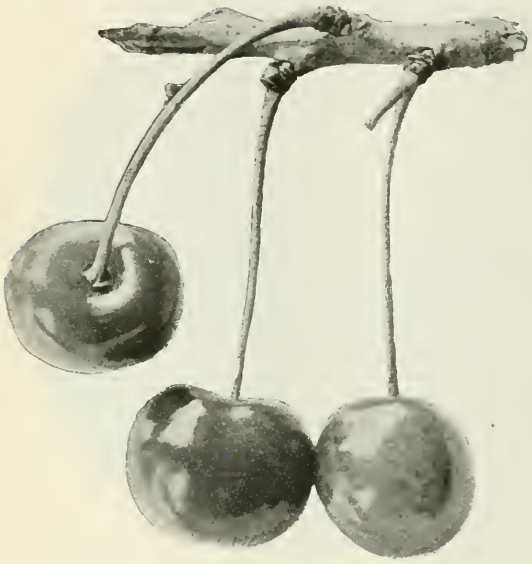
ADAPTABILITY, worthy of trial where Wealthy or Duchess succeeds. Very desirable for northern localities.

CHERRIES.

COE.

(*Coe's Transparent.*)

A good variety for the home garden, but altogether too tender to be popular for the Commercial orchard.



COE'S TRANSPARENT.

ORIGIN, in Connecticut, with Curtis Coe, of Middleton.

TREE, healthy, fairly vigorous, with round spreading head, third rate in productiveness ; group, Heart.

FRUIT, medium to large, about one inch long by one inch broad ; round and regular in form ; skin, thin, bright shiny amber, nearly covered with rich cornelian, marked with peculiar mottled blotches ; stalk one and a half to two inches long set in a medium wide cavity ; suture obscure.

FLESH, very pale yellowish tint; texture very soft and tender, juicy ; flavor very good if not left hanging too long.

SEASON, July 7th to 14th (1897).

QUALITY, good for dessert.

VALUE, second rate for home market fourth rate for distant market.

ADAPTATION, south of Lake Ontario.

EARLY RICHMOND.

(*Virginian May; Kentish Pie* (*Hogg*) ; *Hative* (*LeRoy.*)

This cherry appears to be of French origin, and George Lindley supposed that it had been brought into England from Flanders in the reign of Henry III.

TREE, slow grower, slender in branch, very hardy; very productive in proportion to its size.

FRUIT, below medium, free from rot and not very subject to curculio; form, almost round, though slightly flattened ; skin, uniformly of a bright clear red, becoming darker as it matures; stem slender, about one inch in length, often carrying the calyx inserted in a good sized cavity : apex set in a small indentation.

EARLY RICHMOND.

FLESH, very tender in texture, yellowish with abundant uncolored juice ; flavor quite acid, pit small.

SEASON, June 20 to July 10, (1899.)

QUALITY, poor for dessert, but first-class for all culinary purposes.

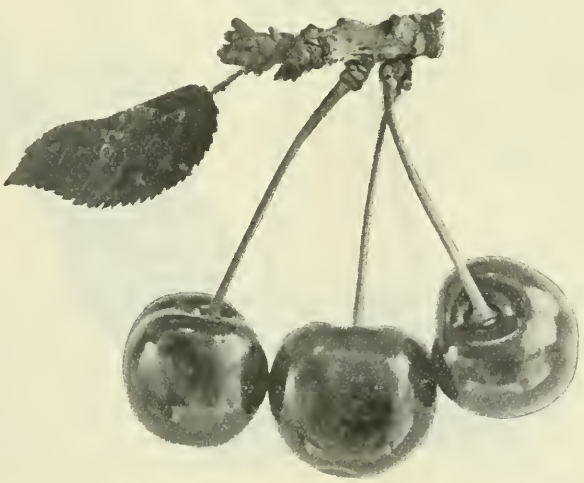
VALUE, very good for market.

ADAPTATION, succeeds at all the stations.

EARLY PURPLE.

(*Early Purple Guigne.*)

The earliest cherry is the Early Purple, a foreign variety known in France as the Early Purple Guigne. The tree is a vigorous, upright grower, and becomes quite productive as the tree acquires age. A tree at Grimsby, about thirty years planted, yielded in 1896, 144 quarts. They were harvested on the 11th of June, and sold in the wholesale market at an average of twelve cents per quart. This is the tree's best record, for usually the birds destroy the fruit before it matures, and if gathered as soon as colored red, it is little more than "skin and bones." The last few days of growth it fills out wonderfully, and becomes almost a so-called "black cherry." The branch which we photographed was taken from the tree above referred to and shows the habit of fruiting.



EARLY PURPLE.

TREE, upright, vigorous, healthy, productive when full grown.

FRUIT, medium size, roundish heart-shaped; skin dark red to purple: stem two inches long in a shallow cavity; suture obscure.

FLESH, red to purple; texture tender, juicy; flavor sweet and pleasant.

SEASON, June 13th to 25th, south of Lake Ontario.

QUALITY, dessert, good.

VALUE, market, 2nd rate.

ADAPTATION. Grown at Grimsby for thirty years and quite hardy; fairly hardy in Maine and Michigan; recommended for trial north of Lake Ontario.

GOVERNOR WOOD.

This variety has proved itself a most satisfactory cherry for both dessert and market purposes. It is a very productive variety, and, though somewhat tender in flesh, is not nearly so subject to ravages by birds as Early Purple or Black Tartarian. Originated by Prof. Kirtland of Cleveland, Ohio, U.S.A.

Governor Wood.

Tree, upright, spreading, healthy, vigorous and hardy wherever the peach succeeds.

Fruit, medium to large, roundish-heartshaped ; skin, light, yellow, shaded with light to deep red ; stem 1½ to 1¾ inches long in a broad deep cavity ; suture, distinct on one side.

Flesh, yellowish, tender, juicy, sweet, aromatic and delicious.

Season, June 16th to June 25th.

Quality, dessert, 1st rate ; home market, very good ; distant market, good.

Value, market, 1st to 2nd rate.

Adaptation. Wherever the peach succeeds.

HORTENSE.

(*Reine Hortense.*)

One of the finest flavored of cooking cherries, and one which deserves the first place in the home garden. It is not as productive as the May Duke, but from its habit of fruiting singly is less subject to rot than that excellent variety.

HORTENSE.

ORIGIN, France, in 1832, by M. Larose, Neuilly ; first fruited in 1838.

TREE, of Duke habit, a vigorous and handsome grower and fairly productive ; Duke.

FRUIT, large to very large, roundish, elongated, sides slightly compressed ; skin, thin, light, shining red mottled with darker red, becoming richer in color the longer it hangs ; stock, slender, about two inches long.

FLESH, creamy yellow, netted, very tender, juicy ; flavor, slightly subacid, excellent.

SEASON, July 10th to 15th in 1897.

QUALITY, first-class for cooking.

VALUE, 1st to 2nd rate for market.

ADAPTATION, succeeds perfectly South of Lake Ontario.

KNIGHT.

(*Knight's Early Black.*)

A delicious early, black cherry, ripening about a week in advance of Black Tartarian. It is a regular and even bearer, the average yield being from seventy-five to 100 quarts per annum. The fruit is borne singly or, occasionally, in pairs, and therefore is not gathered as rapidly as those varieties which grow in clusters. It is one of the most valuable dessert cherries, but not as productive as the Tartarian.

ORIGIN, England, by T. A. Knight, in 1810, from Bigarreau crossed with May Duke.

TREE, healthy, fairly vigorous, with spreading head, second rate in productiveness ; Heart.

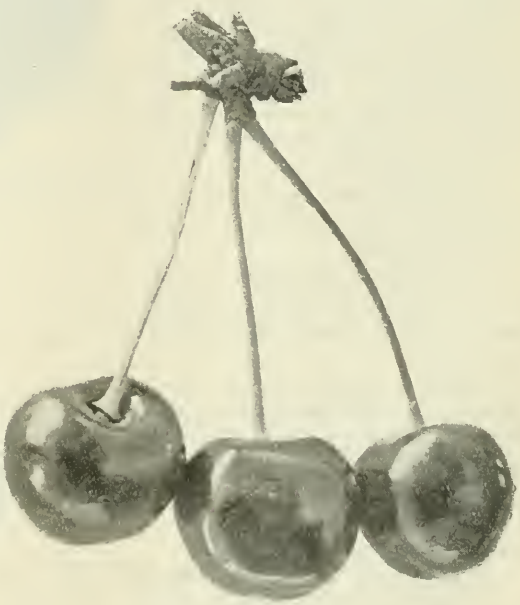
FRUIT, medium to large, obtuse, heart-shaped, uneven ; skin, dark red or purple, becoming almost black if allowed to hang ; stalk two inches long in a rather large cavity.

FLESH, dark red to purple ; texture, tender and juicy, but firmer than Tartarian ; flavor, sweet, rich and delicious ; stone, small.

SEASON, July 1st to 6th (1897).

QUALITY, first-class for all purposes.

VALUE, for market, first-rate.



KNIGHT'S EARLY BLACK.

MONTMORENCY.

Of all the Kentish pie cherries this seems to us the most profitable. The tree is one of the most vigorous in its class, the fruit being large and abundant. This and the early Richmond cover the season very well, and are the two leading Kentish varieties for market. In France, this cherry has many synonyms, as, for example, Montmorency a longue queue, Petit-Gobet, etc.

MONTMORENCY.

ORIGIN, Montmorency valley in France in middle of 17th century.

TREE, hardy, healthy, fairly vigorous, very productive and an early bearer.

FRUIT, attached in ones and twos, $\frac{3}{4}$ long by $\frac{7}{8}$ inch broad, roundish, almost flattened at apex, skin bright shiny red, becoming darker at maturity, easily detached from the flesh ; stem, $1\frac{1}{2}$ inches long, in a rather large cavity.

FLESH, pinkish yellow, tender, very juicy, sprightly acid.

SEASON, July (1899).

QUALITY, very good for cooking.

VALUE, good for market.

ADAPTATION, general.

MAY DUKE.

(Early Duke, Royal Hative.)

The staple variety of cooking cherry in its season, both for home use and market. The great productiveness, health and vigor of the tree, the mild acid of the fruit ripening over a considerable season, all tend to make this a favorite variety in all cherry-growing districts. The fruit is rather tender for distant shipments.

ORIGIN, Médoc, a Province in France, from whence the name is said to be a corruption.

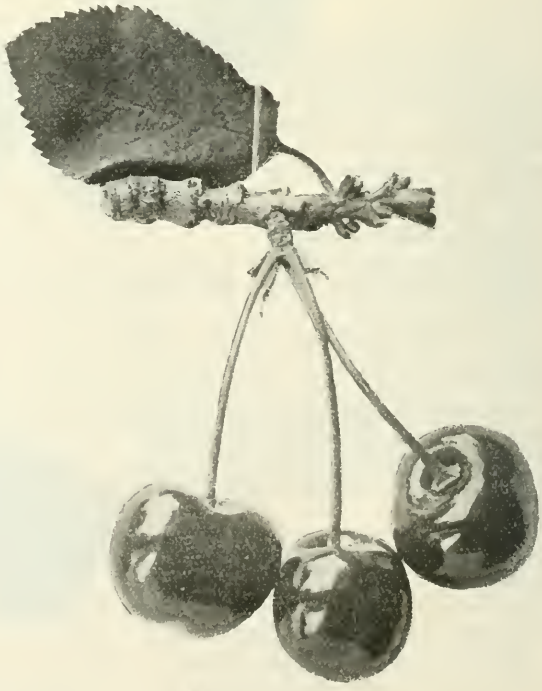
TREE, upright, of fastigiate head, a habit especially noticeable in young trees ; vigorous, hardy, and productive ; Duke.

FRUIT, roundish, obtuse heart-shaped, with traceable suture and distinct indentation to apex ; grows in clusters; skin, bright red turning darker at full maturity ; stalk $1\frac{1}{2}$ to 2 inches long ; stone small.

FLESH, red, tender, very juicy ; flavor, sub-acid and very good.

SEASON, June 12th to 20th (1897).

QUALITY, good for dessert ; first-class for cooking.



MAY DUKE.

NAPOLEON.

Napoleon Bigarreau, Royal Anne of California.

A valuable variety of foreign origin. Perhaps the most productive variety known, yielding fruit of the very largest size which is in good demand and, therefore, one of the most desirable varieties for the commercial orchard. It has one serious fault, namely, it is very subject to the rot, especially in wet seasons, and sometimes the whole crop of this variety is ruined by it.

NAPOLEON.

TREE, upright, spreading, vigorous, hardy on the south shore of Lake Ontario. Very productive.

FRUIT, very large, oblong heart shaped ; skin, yellow ground, light in shade, rich red cheek in the sun, sometimes mottled ; stem, $1\frac{1}{8}$ inches long ; suture plainly traceable.

FLESH, yellowish white, very firm, meaty, fairly juicy, good flavor, much esteemed for canning because it looks well in the jars and bears cooking well.

SEASON, July 8th to 16th.

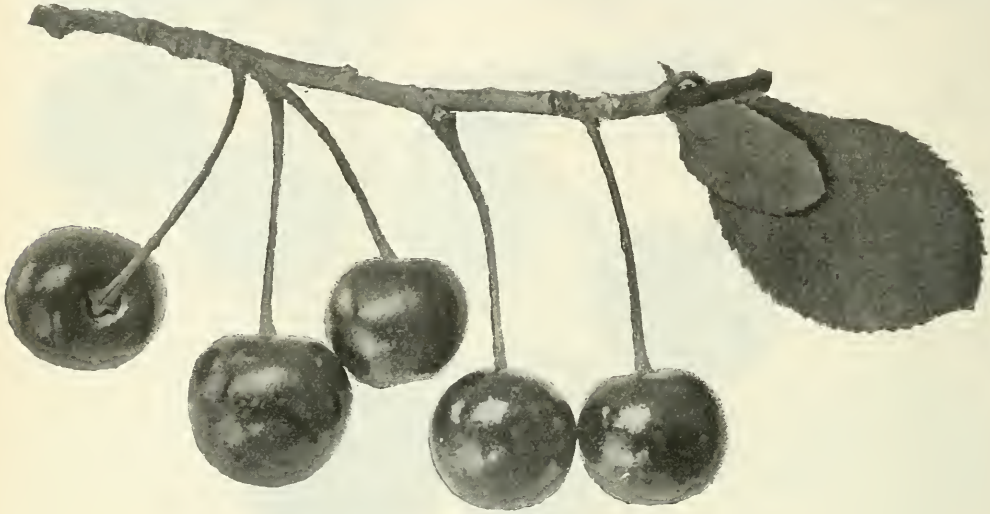
QUALITY, dessert medium ; market, very good to best.

ADAPTATION, the southern part of the Province of Ontario.

OSTHEIM.

(*Griotte d' Ostheim.*)

This cherry was distributed throughout the Province by the Ontario Fruit Growers' Association. The fruit is of fair size, productive enough to be profitable, and good for all purposes. Its hardiness should make it a special favorite in the colder sections to succeed the Montmorency.



OSTHEIM.

ORIGIN, South of Spain, brought to Germany early in the 18th Century, and cultivated near Ostheim, in Saxe-Weimar, whence its name.

TREE, third rate in vigor, almost a dwarf, first in hardiness, and second rate in productiveness; Morello.

FRUIT, medium, about $\frac{9}{10}$ x $\frac{13}{16}$ of an inch in length and breadth. The variety must vary, since Dr. Hogg describes it as large, and LeRoy describes the stalk two inches long set in a pronounced cavity. Round, slightly depressed at the side; color, very dark purple, almost black when ripe; stalk, one and three-eighths inches, in ones and twos; suture not traceable; pit, small, cling.

FLESH, very dark purple, tender, juicy, almost sweet when ripe, agreeable.

SEASON, July 18th to 30th, or even longer, improving in flavor the longer it hangs.

QUALITY, poor for dessert; fair for cooking.

VALUE, for market, third rate.

ADAPTATION, quite general; found fruiting freely in St. Joseph's Island, Algoma, in 1898.

ROCKPORT.

A Bigarreau originated by Prof. Kirtland, of Cleveland, Ohio. Its season of ripening is about the same as Governor Wood, but it is a heavier bearer of fruit, about the same size and less highly colored. It would be profitable were it not so subject to rot, but nearly every year we have lost a large portion of the crop of this variety at Maplehurst from this cause. In the season of 1896 there was no rot, and a tree of this variety yielded about 100 quarts. Like the other Bigarreaus, it is too firm a cherry to be a favorite with the birds.

TREE, upright, spreading, fairly vigorous and very productive.

FRUIT, large, roundish, obtuse heart-shaped ; skin, amber, nearly covered with bright red.

FLESH, pale yellow ; texture, firm, juicy ; flavor, sweet and good.

QUALITY, dessert or cooking, good ; home market, second rate.

SEASON, June 26 to July 3.

ADAPTATION, southern Ontario

CURRANTS.

NORTH STAR.

We have fruited this variety since 1896 at Grimsby, and at first we were inclined to condemn it as too small, but it has grown in favor each year, until, in 1899, it has surpassed most varieties in productiveness, in health and vigor of bush, and in keeping qualities. At date of writing, August 20th, the fruit still hangs as bright in appearance as it was a month ago. Possibly it would pay currant growers to hold the fruit for the latest market, for in the height of the currant season, the price is often very low.

NORTH STAR.

ORIGIN, Minnesota.

PLANT, vigorous, healthy, very productive.

BUNCH, compact, three to four inches long, inclusive of about an inch of naked stem, which is convenient in gathering.

BERRY, round, $\frac{3}{8}$ inch in either diameter ; skin thin, bright red ; sub-acid.

QUALITY, cooking very good.

VALUE, second rate on account of size, but season and productiveness considered, it might be classed first rate.

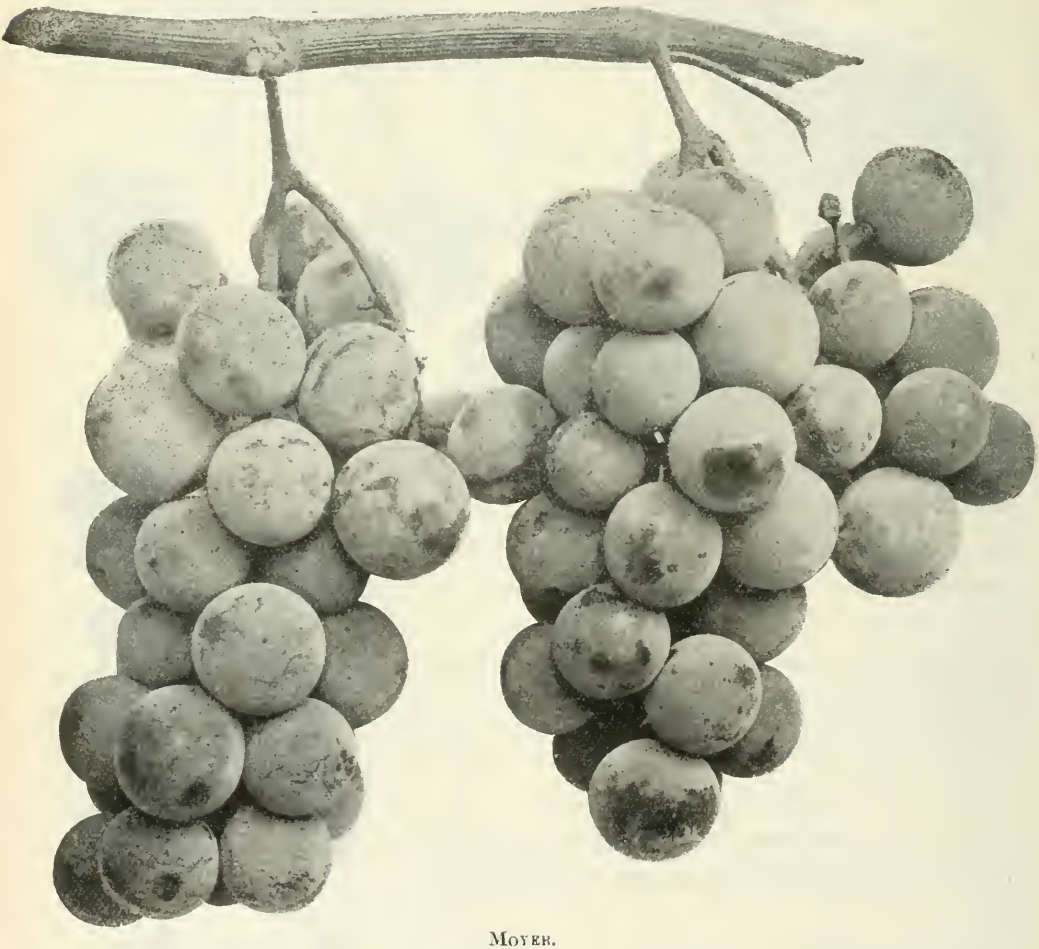
SEASON, July 15 to September 1.

ADAPTATION, general.

GRAPES.

MOYER.

For the amateur's garden this is a grape that should not be overlooked, for as a dessert grape it has now been tested about eighteen years and is rather growing in favor.



MOYER.

ORIGIN, at Port Dalhousie, Ontario, by W. N. Read, from Delaware, fertilized with Miller's Burgundy about 1880.

VINE, fairly vigorous, healthy and not subject to mildew, hardy, not very productive.

BUNCH, small, cylindrical in form, shouldered, not very compact, not uniform in size.

BERRY, small, half to three-quarters of an inch in diameter, round, amber, with grayish bloom; skin, thin, tough; pulp, tender, juicy; flavor, rich, sweet and excellent.

SEASON, August 20.

QUALITY, very good, but not equal to Delaware.

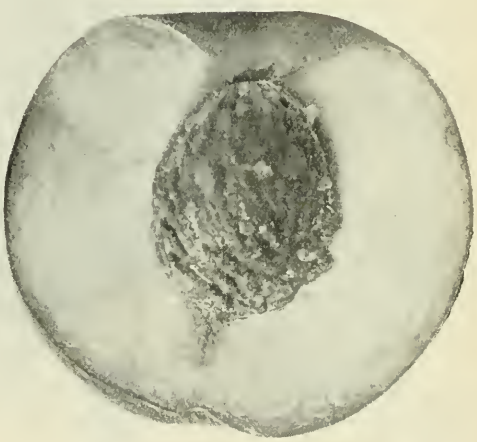
VALUE, very good for market.

PEACHES.

ALEXANDER.

The earliest peach grown in the Niagara district and in Essex county. It is a clingstone of poor quality for dessert purposes and poor also for cooking, so that, in competition with yellow-fleshed varieties from southern orchards, it sells at a low price in our markets.

ALEXANDER.



SECTION OF ALEXANDER.

ORIGIN, chance seedling, Mount Pulaski, Ill., on farm of A. O. Alexander.

TREE, vigorous, hardy, productive.

FRUIT, medium, globular, sides unequal; color, greenish, suffused with dark and light red; suture broad; apex slighly sunken.

FLESH, greenish white, firm, juicy, half melting, clings to stone; flavor, sweet and fairly good.

SEASON, July 20 to 30, (1896.)

QUALITY, dessert poor; cooking poor.

VALUE, home market poor; distant market very poor.

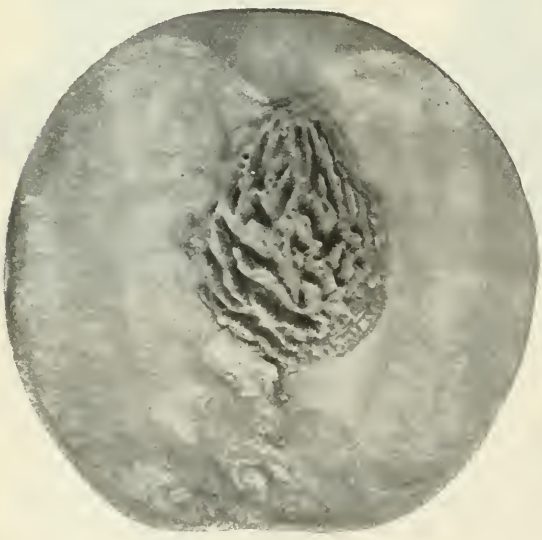
ADAPTATION, succeeds at Niagara and southwestern stations.

RIVERS.

When first introduced this peach was widely planted for market because of its fine size and early season, coming in between Alexander and Hale's Early. Its great fault is its delicate

EARLY RIVERS.

skin and tender flesh which shows the slightest bruise, so that the most careful handling is necessary. The fruit needs thinning for size and color, and then it can be sent only to the nearest markets.



SECTION OF EARLY RIVERS.

VALUE, second rate for market.

ADAPTATION, Niagara district and Essex county.

ORIGIN, by Thos. Rivers, of Sawbridgeworth, England.

TREE, very vigorous, fairly hardy and very productive.

FRUIT, medium to large, about 2¼ to 2½ inches, roundish, often somewhat oblong and flattened on the sides, and more or less one-sided; skin, smooth, light green, almost white, delicately shaded with red; cavity, small and deep; apex, small in a narrow, deep depression; suture, deep and distinct: stone, half cling, inclined to split.

FLESH, creamy white, melting, juicy, fairly sweet and agreeable.

SEASON, August 10 to 20.

QUALITY, fair for dessert; fair for cooking.

PEARS.

BOUSSOCK.

(*Doyenne Boussock*).

DOYENNE BOUSSOCK.

Described by Downing as a profitable market sort, but our experience in Canada would lead us to give it a second place when compared with the Bartlett or the Anjou. The tree is a good grower and productive, and the fruit is uniformly large, but it is second class in quality unless eaten just at the proper stage of ripeness, and the tree is inclined to drop its fruit too soon.

ORIGIN, Belgium.

TREE, succeeds best as a standard ; vigorous, hardy and very productive.

FRUIT, large, about three inches in either diameter ; form, roundish, obovate : skin, yellow, with dull red cheek, and numerous rough dots , stalk, fleshy, stout, one inch to one and one-quarter inche in length, in a round cavity ; calyx, open, in a shallow russeted depression.

FLESH, white, tender, juicy, if gathered at the right season ; flavor, sweet and agreeable.

SEASON, September.

QUALITY, dessert, very good.

VALUE, near markets, very good.

ADAPTATION,

SECTION BOUSSOCK.

SHELDON.

SHELDON PEAR.

One of the most delicious of dessert pears, if eaten just at the proper time Worthy of a place in every home garden, but not productive enough to be planted for market.

ORIGIN, accidental on farm of Norman Sheldon of Huron, Wayne Co., N. J.

TREE, vigorous, erect, not very productive, late coming into bearing.

FRUIT, above medium in size, roundish, obtuse obovate; skin, yellowish-green, covered with thin light russet, brownish crimson in sun, russet dots; stalk, short, stout, in a narrow cavity; calyx nearly open, in a broad basin.

FLESH, creamy buttery, juicy, sweet, aromatic.

SEASON, October.

Tested twenty years at Maplehurst.

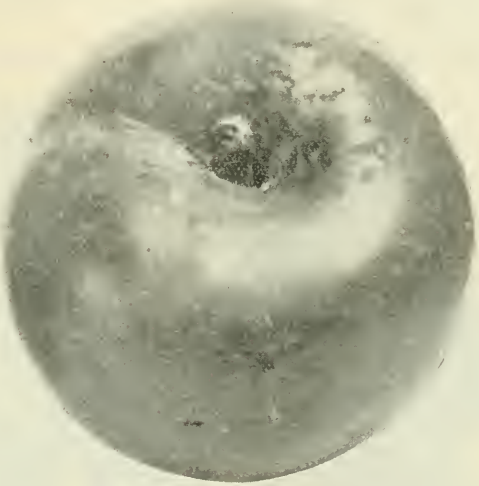
SECTION SHELDON.

PLUMS.

SIMON.

(*Prunus Simoni*, *Simonsi* (*Thomas*), *Simon's Plum.*)

A distinct species of stone fruit, having characteristics of both the peach and the plum. It has been tested in Ontario since 1888, and has not realized the expectations of planters who were led to expect in this fruit a substitute for the peach where the latter fruit was uncertain.



SIMON.

It has proven itself worthless in the commercial orchard, and valuable only as a curiosity.

ORIGIN, northeastern China, introduced to France by Eugene Simon and disseminated by Simon Bros. of Metz, Alsace. Fruited at Cornell University in 1886, and at St. Catharines, Ont., in 1887. It was placed on the plant distribution list by the Fruit Growers' Association in 1890.

SECTION OF SIMON.

TREE, upright, slender, lacking in vigor, not productive.

FRUIT, large, $1\frac{3}{4}$ x $2\frac{1}{4}$ inches in diameter; form, round transversely and flattened longitudinally; color, dark maroon, with a perceptible bloom; stalk, half an inch long, stout, set in a deep cavity; suture, distinct; stone smooth, clings tightly to the flesh.

FLESH, orange color; texture, tough and juicy; flavor often bitterish, fairly agreeable.

SEASON, August 5 to 12.

QUALITY AND VALUE, very poor.

ADAPTATION. The peach sections.

RASPBERRIES.

CAROLINE.

A very productive variety, but of little use for market because too soft for shipping, and not in favor for home use because of its ordinary quality.

ORIGIN, at New Rochelle, N.Y., by S. P. Carpenter; supposed seedling of Brinckle's Orange.

CAROLINE.

FRUIT, medium size; form, round; color, pinkish yellow; seeds, small, close, easily parted from each other and from stalk; flesh, juicy, sweet, lacking in flavor.

SEASON, July 10 to 20, in southern parts.

QUALITY, only fair for all purposes.

VALUE, second rate for home use and market.

CUTHBERT.

(Queen of the Market.)

Previous to the introduction of the Cuthbert, many varieties of raspberries were grown for profit, such as Turner, Philadelphia, Highland Hardy, etc., but these have given place entirely and are heard of no longer. So prolific has this variety proved itself that acres have been planted by fruit growers throughout Ontario, and immense quantities of its fine fruit sent into our best markets until the prices have been brought down very low (1898). A favorite for canning factories.

CUTHBERT.

ORIGIN, chance seedling in the garden of Thomas Cuthbert, Riverdale, N.Y.

PLANT, vigorous, canes strong, often six feet high or more on rich sandy loam not too dry; sometimes branching; very productive; spines, short; stout, numerous; suckers almost too freely and young growth needs to be kept within bounds; species, R. strigosus.

FRUIT, large, $\frac{7}{8}$ x $\frac{5}{8}$ inch; color bright crimson; form, conical, obtuse at apex; seeds, small, compact, part easily from stalk when very ripe; flesh, firm, fairly juicy, sweet, agreeable.

SEASON, July 14 to August 1, in southern parts of the province.

QUALITY, first-class for cooking; good for dessert.

VALUE, first rate for market.

ADAPTATION, pretty general.

MARLBORO.

This raspberry has been coming gradually to the front ever since its introduction about the year 1880. The old Highland Hardy for a while disputed its place as an early market berry, but the superior size and beauty of the former soon caused the latter to give place entirely, until Marlboro and Cuthbert have become (1899) the two leading varieties of red raspberries to cover the season.

MARLBORO.

PLANT, fairly vigorous; canes, short, stout, upright, without branches; propagated by suckers; fairly productive; species, R. Strigosus.

BERRY, round, about three quarters of an inch in either diameter; color, light red; seeds, close and firm; flavor, mild, pleasant; texture, rather seedy.

QUALITY, fairly good.

VALUE, market, first rate.

SEASON, July 1 to 15.

SHAFFER.

On its first introduction the Shaffer created much enthusiasm by reason of its thrift, productiveness and good quality. It is still considerably grown for canning purposes, but its color is not a favorite in the market.

SHAFFER.

ORIGIN, On farm of Mr. Shaffer, Wheatland, N.Y., in 1869; introduced by Chas. Green, Rochester, in 1881.

PLANT, very vigorous; canes grow six or seven feet high, if not pinched back: very productive; species, R. neglectus; propagates from tips.

FRUIT, large, $\frac{3}{4}$ x $\frac{7}{8}$; color, purple; form, roundish; grains, large, loose, easily separated from stalk; flesh, very juicy and tender; flavor, sweet, rich and very agreeable.

SEASON, July 12 to 24 in Niagara district.

QUALITY, first-class for cooking, good for dessert.

VALUE, first rate for home use, second rate for market.

MEETINGS OF THE BOARD OF CONTROL.

A meeting of the Board of Control was held at Toronto March 3rd, 1899.

The Secretary was instructed to send a collection of hardy stock of the various kinds of fruit to the Algoma Station, in charge of Mr. Charles Young, of Richard's Landing.

The Secretary read some correspondence from the Hon. John Dryden, regarding the use of the Pioneer Farm at Wabigoon for some experimental fruit-planting. The Board ordered that only the very hardiest kinds be sent for trial to Wabigoon ; a list of the same being first submitted to the Minister of Agriculture.

The Board also ordered that a copy of Bailey's Principles of Fruit Growing be sent to each experimenter, and that each one be advised to read the work carefully.

A meeting of the Board was also held at the Agricultural College, Guelph, on the 7th and 8th of Dec., 1899, when the report of Mr. A. M. Smith, of inspection of northern stations, was received and adopted.

The work done during the year by the Secretary on Fruits of Ontario and the accompanying photographs of fruits were carefully revised and adopted for publication.

The various reports from the experimenters were received and the Secretary was instructed to revise the same for publication ; and to certify to the payments of the amounts due.

The Secretary reported on the results of an experimental shipment of Canadian Rogers grapes to Manchester, Eng., made in November, 1899, under instruction from the Board, with the approval of the Hon. John Dryden, Minister of Agriculture, which was received and adopted. This report went to show that black and red Rogers grapes promise to be valuable for export to Great Britain.

APPLES.

Notes on Vigor and Habit, by W. H. Dempsey.

(Bay of Quinte Station.)

Downing's Maiden's Blush. Planted in 1896 ; growth in 1898 of 20 inches ; a well formed tree, foliage good.

Boiken. Planted in 1897. Made a good growth of 18 inches ; foliage heavy ; tree spreading, making a fine formed tree.

Shackleford. Planted in 1896. Has made a slender growth of 18 inches, and inclined to droop ; foliage medium.

Wallbridge. Planted in 1896. Made a good growth of 20 inches. Upright ; somewhat spreading. A handsome tree ; foliage good.

Peter. Planted 1897. Made a good growth of 20 inches. Upright, spreading, not inclined to throw out many shoots ; quite inclined to make a one-sided tree.

Western Beauty. Planted in 1896. Made a fair growth of 14 inches ; shoots heavy ; inclined to grow one sided ; foliage heavy.

Barry. Planted in 1896. Made a fair growth of 16 inches ; shoots medium, spreading ; foliage medium.

Sutton's Beauty. Planted 1896. Made a fair growth of 16 inches, making fine upright tree ; foliage good.

Starr. Planted in 1896. Made a growth of 14 inches. Has a tendency to throw out too many shoots ; foliage good. Trees were large, one year old when planted, but it would be impossible to pick them out from the rest at present.

Beauty of Bath. Planted 1896. Made a growth of 16 inches ; heavy, not many shoots, spreading, making a fair tree ; foliage good.

Walter Pease. Planted 1896. Made a good growth of 20 inches ; medium size ; shoots upright ; foliage good.

Dudley's Winter. Planted 1896. Made a growth of 20 inches, making one sided tree ; foliage heavy, good.

Aikin Red. Planted 1897. Made a slender growth of 16 inches ; trees almost drooping ; foliage good.

Lankford. Planted 1897. Made a slender growth of 20 inches ; almost drooping ; foliage medium.

Newtown Pippin. Planted in 1897. Made slender growth of 14 inches ; upright ; foliage medium.

Milding. Planted in 1897. Made a growth of 16 inches ; heavy, upright, making a fine tree ; foliage heavy, good.

Yates Red. Planted in 1897. Made a growth of 18 inches ; medium, fine-shaped tree ; foliage good.

Gano. Planted in 1898. Made a growth of 16 inches, making a fine tree.

Notes on New Varieties.

Arkansas Beauty. Top grafted in 1896. Made a fair growth ; foliage medium : bloomed May 14th. Fruit, 2½ by 2 inches, oblate, conical. Skin greenish yellow, nearly covered with dark red with a few splashes of a livelier red on side next the sun. Calyx closed, set in a narrow, moderately deep, corrugated basin. Stem ½ inch, slender, set in a narrow, moderately deep cavity. Flesh greenish white, tender, crisp, juicy, pleasant, sub-acid. Core, small. March and April.

Boiken Top grafted in 1895. Made a very good growth although fruiting for three years, and this season a heavy crop for the amount of wood ; bloomed May 14th. Fruit large, 3¼ by 2¾ inches, roundish, oblique. Skin yellowish white, with numerous small white dots, often flushed with red on side next the sun. Calyx closed, set in a broad corrugated basin. Stem, ¾ inch, set in a moderately deep cavity. Flesh white, crisp, brisk sub-acid. Kept good through March and fairly good till May.

Garden Gem. Top grafted in 1896. Made a medium growth, and fruited this year for the first ; bloomed May 13th. Fruit large, 3 by 2½ inches, oblate, conical. Skin waxen yellow, thinly covered with red on side next the sun, with streaks and splashes of darker red. Calyx closed, set in a deep uneven basin. Stem slender, 1¼ inch, set in a deep uneven cavity. Flesh white, crisp, tender, juicy, pleasant, sub-acid ; a good September dessert apple. Fairly productive.

Hamilton. Top grafted in 1896. Slow grower ; heavy wood, fruited this year for the first, and had all the apples it could possibly mature on it. Fruit 3 by 2¼ inches, oblate, conical, yellowish white. Calyx partially closed, set in a broad uneven basin. Stem, ½ inch, medium heavy, set in a narrow, deep russet cavity. Flesh white, a little coarse. September-October. Would not take well in market.

Jeffries. Top grafted in 1895. Has made a fair growth. Fruit large, 3 by 2½ inches, round, oblate. Skin yellow, shaded and splashed with red, with numerous white dots. Calyx closed, set in a deep basin. Stem, ½ inch, set in a deep cavity. Flesh white, with a few slight streaks of red ; tender, juicy, rich, mild, sub-acid. Good through September. One of the best of its season

Lady Sweet. Top grafted in 1895 ; not a very strong grower. Fruit medium, 2¾ by 2½ inches, roundish, ovate. Skin, pale yellowish green, nearly covered with red, with darker streaks and splashes of red covered with a thin white bloom. Calyx small, closed, set in a narrow plaited basin. Stem, ½ inch, set in a shallow cavity. Flesh greenish white, tender, juicy, crisp, sprightly. March and April.

McLean. Top grafted in 1895. Made a good growth ; fruited this year for the first. Fruit medium, 2½ by 2¼ inches. Round, ovate whitish yellow, thinly covered with light red on sunny side with a few dark red blotches with streak, same as in Talman. Calyx closed, set in a shallow, broad basin. Stem ½ inch, slender, set in a moderately deep cavity. Core very small. Flesh white, tender, crisp, melting, juicy, very pleasant, mild, sub-acid. A good dessert apple. October.

Parlin's Beauty. Top grafted in 1896. Made a medium growth. Fruit 3 by 2½ inches, oblate, conical Skin yellowish white, nearly covered with light red, splashed and striped with darker red. Calyx closed, set in a narrow plaited basin. Stem ¾ inch, heavy, set in a broad cavity. Flesh white, tender, melting, juicy, brisk, sub-acid. Good October dessert apple.

Starr. Top grafted in 1895. Has made a good, strong growth ; good, healthy foliage ; fruited this year for the first. Fruit roundish, oblate, 3½ by 2½ inches. Skin whitish yellow, a few grey dots, and some of the dots are red. Calyx closed, set in a broad corrugated basin. Stem medium, ¾ inch, set in a shallow cavity. Core small. Flesh white, tender, crisp, pleasant. sub-acid : ripened very uneven through August. October. Abundance of fruit for the amount of wood.

Ulter's Red. Top grafted in 1895. Medium growth ; fruited last year ; bloomed May 14th ; set very light. Fruit 3 by 2½ inches, roundish, oblate. Skin yellowish white, with a few splashes of red on side next sun. Calyx open, set in an uneven broad basin. Stem short, sometimes a fleshy knot set in a shallow cavity. Flesh yellowish white, tender, sub-acid. September and October. Not desirable.

Rochelle. Top grafted in 1894. It has made a fine top, and fruited this year for the first time; it came into bloom May 13. Fruit large, 3¾ by 3 inches, roundish, ovate. Skin light straw, nearly covered with light red, streaked and splashed with dark red, with numerous large grey dots. Calyx closed, set in a broad uneven basin. Stem ½ inch, set in a narrow, deep cavity. Flesh whitish, coarse, sub-acid. Core small for so large an apple. Season, October. Fruit fell early in October, as is the case with nearly all large apples.

Winter Banana. Top grafted in 1896. Made a good upright growth; had a few imperfect specimens on last year; kept good in fruit-house until March; bloomed May 14th. Fruit large, 3 by 2¾ inches, round, ovate. Skin whitish yellow, flushed with red on side next the sun, with numerous white dots. Calyx partially open, set in a plaited basin. Stem 1 inch, heavy, set in a broad moderately deep cavity. Core large. Flesh white, crisp, juicy, brisk, sub-acid.

Wolf River. Top grafted in 1894. Made a strong, vigorous growth; heavy foliage; had a few apples on last year and a good crop this year. Fruit large, 4¼ by 3½ inches, roundish, oblate. Skin greenish yellow, nearly covered with red, with splashes of darker red, numerous white dots. Calyx partly closed, set in a narrow basin. Stem ¾ inch, set in a deep russet cavity. Flesh white, coarse, tender, mild, sub-acid. September and October. Fruit clings to the tree better than Alexander, and will keep much longer, and is of the same value in the market, but a little more uneven in size.

Scions Grafted during the years 1895 and 1896.

Akins. Had one sample last year. Kept until April; this year has five. Fruit medium; attractive; bright red.

Arkansas Black. A fine looking apple of medium size; bright red, nearly covered with splashes and stripes of darker red. Three apples this year.

Barry. Yellowish white; dropped early, also ripened; not attractive in appearance.

Berton County. Bore heavily; resembles Ben Davis; medium.

Clayton. Another fall apple of fine appearance, of which we have so many; three samples; bright in color; good size.

Duffey's Seedling. Very attractive; bright red in color, and very productive.

Haskell's Sweet. One apple; does not look as if it would be any improvement on Talman, and of similar color.

Isabella. Three samples of good size, and of the appearance of Greening; ripened first of October.

Isham. A fine, bright colored apple, four samples.

Missouri Pippin. Very dull, dark red apple, small to medium in size.

Mammoth Black Twig. Not so large as the name would indicate, only medium; dark red on a greenish ground; very hard; no doubt would keep well.

Minkler. Medium to large. Quite productive from the amount of wood this year; every apple perfect; well covered with dark red.

Pioneer. (California Seedling). Large whitish yellow apple; good form.

Rome Beauty. Very handsome apple of good size; bright red in color.

Windsor Chief. Has borne two or three apples for two or three years; does not seem inclined to fruit heavily. Fruit is of good size and firm; dark red; kept well.

York Imperial. Fruit this year for the first; very attractive in appearance; bright red, and a good crop from the amount of wood.

Notes on Commercial Varieties, by A. E. Sherrington.

(Lake Huron District).

The winter of 1898-9 was a trying one to the fruit growers, not so much on account of the extreme cold but owing to the length of the cold spell with but little snow on the ground. Although we had it 30 degrees below zero there was comparatively little damage done to the fruit trees in this district. The loss at this station from this cause was four or five plum trees and about the same of young apple trees. Raspberries suffered somewhat, but not so much from the frost as from the snow breaking the canes down in the latter part of the winter, thereby lessening the yield of some of the varieties. There was not much planted at this station the past spring—two or three varieties of plums and about the same of cherries, and a few currants. The stock is all doing well, with the exception of a few trees. None of the trees started well in the spring. The buds appeared weak, and were either injured by the winter frost or from fumigation. They were slow in starting. The tent-caterpillar has been very numerous the past season, to such an extent in some localities that forest trees as well as orchards were entirely stripped of their foliage. The codling moth was very active, and spraying is still rapidly gaining in favor. The apple crop was much larger than was expected in the fore part of the season with a marked improvement in quality. The bearing orchard at this

station is about five acres, and the yield was about 300 bbls. of first-class winter fruit, the Ben Davis and A. G. Russet being especially fine. Pears were light, but of fair quality. Plums were a good crop. Cherries were fair, but the black-knot is getting in its work in this district. Small fruits were all good, owing much to the abundance of rain during the fruiting season.

This fertilizing experiment, I presume, has been dropped, as I did not receive any material this season to carry it on with, but there is a marked difference in quality as well as quantity of the fruit upon the plot that had been treated for the last two seasons. The following are some notes on a few of the leading varieties :

A. G. Russet. Tree spreading, fairly vigorous and hardy ; fruit medium to small ; quality fair ; average yield of fifty trees 20 years planted, 2 bbls.

Ben Davis. Tree upright, spreading, vigorous, hardy and productive ; fruit medium to large ; quality only fair ; yield 4 bbls. per tree ; 20 years planted.

Greening. Tree spreading, vigorous and fairly hardy ; not as productive as it might be, but profitable ; quality best ; season December to April : yield 2 bbls. per tree ; 20 years planted.

King. Of spreading habit, vigorous but not as hardy as it might be ; fruit large and of the best quality, but does not yield enough to make it a profitable variety ; season October to February ; yield 1 bbl. per tree.

Mann. Tree upright, spreading, vigorous and hardy, but not productive enough to make it profitable ; fruit medium to large ; of rather poor quality ; season February to May ; yield 1 bbl. per tree.

Spy. Tree upright, spreading, vigorous and hardy, rather long coming into bearing ; fruit large, quality best, but subject to spot ; season January to May ; yield 2 bbls per tree.

Oldenburg. A profitable fall variety of the best quality, bears young, hardy and prolific bearer ; season August to September ; yield 2 bbls. per tree.

Ontario. This variety is of great promise ; it is vigorous and appears to be a hardy and an early bearer ; fruit large ; quality good ; season February to May.

Pewaukee. Tree very vigorous and hardy ; fruit large and of fair quality ; an abundant bearer but drops badly ; season January to March.

Notes on Hardy Apples, by G. C. Caston.

(*Lake Simcoe Station.*)

Everything in the experimental grounds here is growing well, and is apparently healthy. Though there is little to add to the report of last year. This is an off year for cherries, plums and pears here, so that there is nothing to report of these fruits except that they are all growing nicely and will probably fruit next year.

However, several new varieties of apples have fruited this year, a description of which is given below. The apple crop was very irregular in this district, while some orchards have fair crops of good quality, others were entirely barren. But I think that most cases of barren orchards could be traced to some preventable cause, such as damage the previous year or years from tent caterpillar and other insects, fungi, etc. Orchards that have been regularly and properly sprayed for the last few years have responded liberally by a good crop of apples of good quality which sold for very satisfactory prices.

Climatic Conditions. The winter of 1898-99 will long be remembered as a very severe one (especially by peach growers in southern Ontario), and it was quite expected that severe damage would be done to tender varieties here. The weather was very severe with extremely low temperature during part of February. For nearly a week the thermometer stood in the neighborhood of 20° below, and we had not the usual depth of snow which usually forms a safe protection to the roots of trees here. Yet everything in the tree line came through remarkably well. The only thing entirely killed out was a row of Dwarf Duchess pears. The apricots had a close call, but came through. The blackberries, Erie, Early King, were frozen dead down to the snow line. The weather was fine mostly during the blooming period, and the bees did good effective work among the apple blossoms.

There was abundance of moisture during the summer up to the middle of July. From that to the first of September the weather was very dry and hot.

The season of 1899 may be summed up as follows, so far as the first crop is concerned : No plums or cherries, very few pears, strawberries medium, raspberries and blackberries good, early apples light, fall apples medium, winter apples variable, on the whole nearly an average crop, and of fair quality.

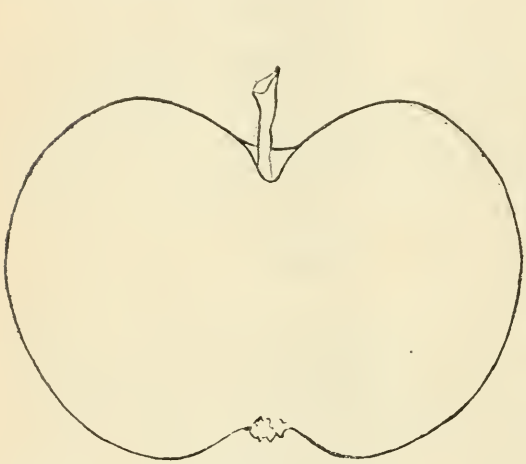
Insects and Fungi. The codling moth is very little in evidence this year. The tent caterpillar, however, has done great damage, and many orchards were completely stripped of foliage. People are slow to learn the benefits of spraying. Those who are doing it faithfully are getting their reward in comparative immunity from insect ravages and in a paying crop of marketable fruit, while those who do not have bare and barren orchards. The green and black aphis was not nearly so bad this year as in 1898, owing, perhaps, to the cool, moist weather of

early summer. To sum it up, those who intelligently and persistently fight insects and diseases with the means that science has placed within their reach will reap their reward.

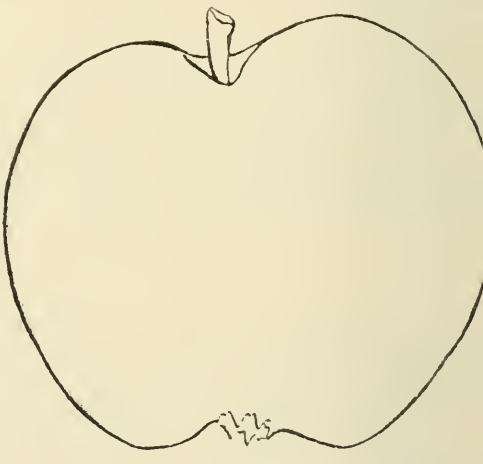
New Apples. Several varieties have fruited this year for the first time, most of them comparatively new varieties. These I have endeavored to describe as follows :

Boiken. Tree received in 1897 from Stone & Wellington. Tree healthy, thrifty grower, spreading, resembling Golden Russet in appearance. Evidently an early bearer, since a tree two years planted bore a dozen specimens of fruit. Fruit oblate, slightly ob ique, 2⅞ in. in diameter ; skin greenish yellow, slightly tinged with red on one side ; stalk short, slender, set in a deep cavity ; calyx partly closed ; basin large, slightly corrugated ; flesh firm, white, juicy, sub-acid, probably a good cooker ; season, evidently a winter apple ; hangs well to the tree up to November.

Gano. Tree thrifty, upright, grower, also an early bearer. Tree four years planted bore about a peck of apples. Fruit, a little above medium ; fruit specimens from 2½ to 3 in. in diameter, roundish, conical ; skin green at first but entirely overspread with dark red when mature ; very much resembling the Baldwin ; flesh white, firm, with an agreeable flavor ; evidently a good keeper. I believe this to be one of the most promising of the new varieties and will take the place of the Baldwin, where that variety proves tender. However, time will tell as to its qualities, and I shall watch its future performance with great interest.

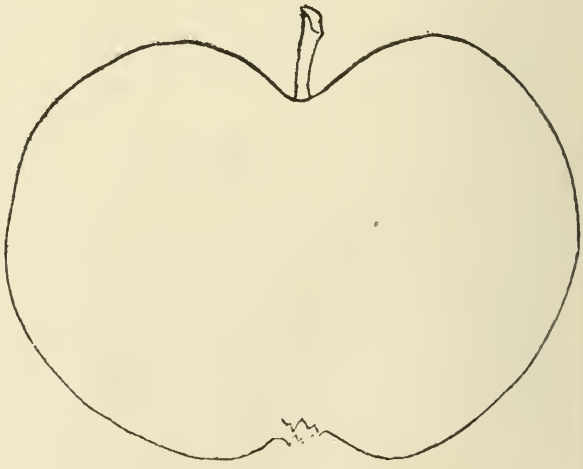


Boiken.



Gano.

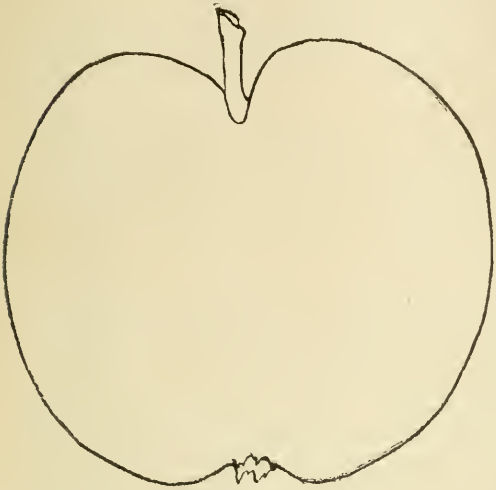
Romanskoe. This is a Russian apple planted in 1894, and bore a few specimens this year, and, like nearly all the Russians, is an autumn variety. Tree hardy, healthy, spreading, and needs little pruning. Fruit, large, 3 inches diameter ; oblate ; stalk, short, stout, set in a wide, moderately deep cavity , calyx, partly closed basin, wide, shallow ; skin dark green, overspread and splashed with red ; flesh white, juicy, a little coarse, sub-acid ; a good cooker ; season, October-November ; a very good fall apple. It might rank fairly with the Colvert, but it bears earlier, and the tree being very hardy it ought to be well suited to northern sections. I would like to see this variety tried in Algoma.



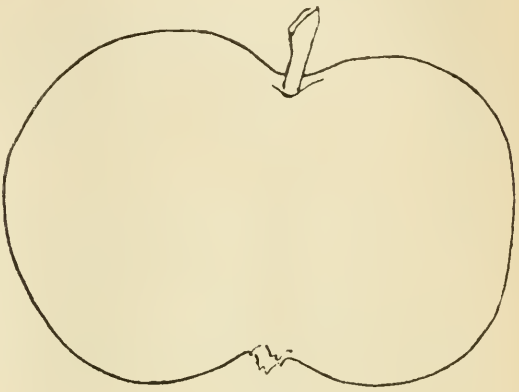
Romanskoe.

McMillan. This is another hardy fall apple grown from scions received from J. P. Cockburn of Gravenhurst, and said to have originated in Muskoka. Fruit a little above medium, 2½ inches in diameter ; skin yellow, overspread and splashed with red. Stalk short, set in a nar-

row cavity. Calyx small, closed in a shallow basin. Flesh white, a little coarse, mealy when ripe. Season, October. As we have already a plethora of fall apples, and this one does not come up to many of our tested varieties in quality, it would be no value here, but might on account of hardiness be useful in more northern sections.



McMillan.



Nod Head.

Nodhead. Grown from scions received from Stone & Wellington in 1895. Fruit oblate, flattened like Wagener ; size above medium ; skin yellow, overspread and streaked with dark red when ripe. Stalk short, set in a shallow cavity. Calyx closed in a shallow basin. Flesh white, a little coarse and dry, with a fair flavor. Season, October and November. As we have many better fall apples, this one is not recommended for planting.

Crabs. Some varieties of these bore a few specimens this year, and like the apples I cannot see that they are any improvement on the older varieties.

Florence. A very handsome crab, one inch in diameter ; skin bright red covered with a delicate bloom. Stalk medium. Calyx closed. Flesh white, of fair quality but quickly turns ; mealy when ripe. Season, August.

Whitney. A large crab, 1½ inches in diameter, conical ; skin green, striped with dark red. Stalk short. Calyx closed. Flesh white, sub-acid, good quality. Season, October. Tree fairly healthy, upright grower.

Telfer Sweet. This crab in the appearance of both tree and fruit resembles the Whitney. Tree an upright grower, needs to be well sprayed as the leaves are very susceptible to fungus. Fruit large, 1½ inches in diameter, conical, pointed. Skin green, splashed and shaded with red. Stalk long, slender in a narrow cavity. Calyx closed, small plaited basin. Flesh white, coarse, dry and mealy, slightly sweet. Season, October.

Paul's Imperial. Tree thrifty, healthy, spreading. Fruit medium, oblate, 1¼ inches in diameter. Skin bright glossy red, very handsome when ripe. Stalk long, slender, wide shallow cavity. Calyx closed. Flesh white, sub-acid, good quality. Season, October. Inclined to scab.

Picta Stricta. This is the only winter crab so far. It would evidently keep till January. Tree a medium grower, spreading habit. Fruit medium conical. Skin yellow, with red cheek. Stalk medium. Calyx closed. Flesh white, fine grained, sub-acid, good quality. Season probably October to January. Inclined to scab, and needs to be well sprayed.

Quaker Beauty. A large, handsome crab somewhat resembling Montreal Beauty, but larger. Tree healthy and thrifty in wood and foliage, spreading habit Fruit large for its class. Skin golden yellow, with bright red cheek. Flesh white, firm, with a slightly astringent taste. Season, apparently October to December.

Notes on Varieties. There are some varieties of apples that are a little tender, and it is well to give a few notes as to my experience with some of these.

Sweet Bough. A tender variety. The tree will not stand this climate, and may be regarded as a failure.

Mann. This is one of the finest and most valuable winter varieties introduced here. It is a valuable variety for export on account of its grand keeping qualities. It has the fault of dropping, however, and should be picked earlier than Spy, or Ben Davis. The tree is only half hardy however. Several of mine have died, and I would strongly recommend top-grafting it on hardy stock. For myself I would not in future attempt to grow it in any other way.

Ben Davis. Though extensively grown here and so far holding an important place in the list of export apples, it may be said to be half hardy. So far it is one of the most profitable winter apples, but not a long lived tree. It is subject to sun scald, and many of the trees show signs of early decay. It gives grand results when top-grafted.

Here is a list of valuable apples that ought to be grown in this section by top-grafting on hardy stock, and in no other way, and that they can be grown to perfection and with profit in this way has been amply proved by experience: King, Spy, Baldwin, Greening, Mann, Ben Davis. This is a fine list and if a grower confined himself to this list alone he would, to use a modern phrase, "be in it."

There is a good list of fall apples that grow to great perfection here, but the question arises should we advise the planting of fall apples at all, have we not too many already. If I were advising a planter (and I am often asked to advise in this matter) I would say go slow in planting fall apples. Will they pay to export? Judging from this year, no. They just reach the British markets in time to come into competition with the home grown apples, and seldom return any profit. Therefore, unless sure that the home market will absorb them I would say go slow on fall varieties.

The chief value of Russian apples will be in their hardiness and adaptabily to the northern sections of the Province, where only the very hardy trees will grow. So far as I know there is not a first-class winter apple among them that would at all compare with King, Spy, Baldwin, etc. They seem to be nearly all early kinds, and have we not already a plethora of them? However they would make excellent stock for top working other varieties on.

I fruited an apple this year which was sent me some years ago from Ottawa, and labelled "Blushed Colville." I did not consider it worth describing as it is absolutely worthless. The tree however is a fine healthy, thrifty grower, and may do for top working.

The McIntosh Red is very popular as a dessert apple, superior in this respect to its parent the Snow. On young trees bearing their first crops, the fruit is large, handsome, and covered with purplish bloom, but as the trees get larger the fruit is smaller and inclined to scab, and needs most thorough spraying. The tree is hardy and a thrifty grower, and if this variety can be grown clean and of a good size, it ought to make its mark as an export apple on account of its high quality as a dessert fruit. It is a better keeper than the Snow.

Top-grafting. An instance of the influence of the stock upon the variety grafted upon it was noticed year. Alexanders top worked on Tallman Sweets were much later than where grown on their own trunks, and some were still clinging tightly to the tree at the time the Northern Spys were picked. There is a point here that has been not d by Prof. Bailey, and one well worthy of extended experiment and study, viz., the possibility of improving the keeping qualities of many varieties in this way, and also improving the productive qualities, by grafting on a hardy productive stock and further increasing this quality by using scions of the most productive trees of the variety you wish to propagate, and still further to take scions from the most productive parts of a tree, for it is well known that often one side of a tree is more productive than the other. Some experimental work along this line may lead to important, interesting, and valuable results.

Effects of Potash. Frequent complaints are heard during dry seasons of trees dropping their fruit. I have found by experiment that trees that had plenty of potash supplied to them in the form of ashes, or otherwise, were almost entirely free from this trouble, while those where no potash was applied dropped their frnit badly. Further experiments along this line will be made, and will no doubt prove interesting if not valuable.

APRICOTS.

Notes on Varieties, by M. Burrell.

(Niagara Station.)

Three of the apricot trees were winter killed, the remaining trees having made a thrifty growth. Two nectarines, Early Violet and Boston, also succumbed, and two mulberries, Downing and New American, shared a similar fate.

BLACKBERRIES.

Notes on Varieties, by A. W. Peart.

(Burlington Station.)

This plant was injured both by the continuous frost of February and the intense summer drouth. They were therefore a light crop. All varieties suffered more or less from the frost,

to that in relation to *hardiness* of varieties, this report is based on their record for a number of years and not this year alone, as it was an abnormal one and not a type of average conditions. All varieties were injured the most on low ground, and the least on high dry soils.

Agawam. Plant upright, spreading, hardy, very vigorous and very productive. Berry oblong, round ; medium size, sweet. Season, medium to late. A profitable variety.

Ancient Briton. Plant upright, spreading, hardy, fairly vigorous and moderately productive. Berry oblong, conical ; medium ; flavor good. Season, medium.

Child's Tree. Plant upright, spreading, hardy, vigorous, moderately productive. Berry ovate, round ; small to medium ; sweet ; sprightly. Season, medium.

Dorchester. Plant upright, spreading, very vigorous, hardy and a moderate bearer. Fruit large, oblong, round, sweet. Season, medium.

Early Cluster. (Probably misnamed.) Plant upright, vigorous and hardy, moderately productive. Fruit medium, oblong, round, good in flavor. Season, medium to late.

Early Harvest. Plant upright, moderately vigorous, hardy, productive. Fruit medium to large, oblong, conical, of fair flavor. Season, early. A good commercial variety.

Early King. Plant upright, spreading, medium vigor, hardy and productive. Fruit small to medium, roundish, oblong, good quality. Season, early to medium. A very promising variety.

Eldorado. Plant upright, spreading, vigorous, hardy, moderately productive. Fruit medium, oblong, conical ; quality good. Season, medium.

Erie. Plant upright, spreading, vigorous, hardy and productive. Fruit medium, conical, round, good in quality. Season, medium. A good market variety.

Gainor. Plant upright, vigorous, hardy and productive. Fruit large, roundish, oblong ; quality fine. Season, medium. A very promising variety.

Kittatinny. Plant upright, very strong and vigorous, productive, and thus far hardy here. Fruit very large, ovate, conical, rich, juicy and sweet. Withstands the drought better than many varieties. Season, late. Profitable for either garden or market.

Lovett's Best. Plant upright, moderate vigor, hardy and fairly productive. Fruit roundish, oblong, small of fair quality. Season, late.

Maxwell. Plant weak and spreading, somewhat tender, not productive. Fruit large to very large, roundish, oblong, of good quality. Season, medium. Not a promising variety.

Minnewaski. Plant upright, spreading, vigorous, hardy, moderately productive. Fruit oblong, round, medium ; quality good. Season, medium.

Ohmer. Plant upright, spreading, moderately vigorous, hardy, fairly productive. Fruit very large, oblong, conical ; flavor pleasant, sprightly. Season, medium.

Snyder. Plant upright, moderately vigorous, hardy and very productive. Fruit oblong, oval, medium, of good quality. Season, early to medium. The drought acts very severely upon this variety unless the ground is well cultivated. One of the best market varieties.

Stone's Hardy. Plant upright, spreading, moderate vigor, productive and very hardy. Fruit, oblong, conical, medium, of good quality. Season, medium. A promising variety.

Taylor Plant upright, vigorous, hardy, and moderately productive. Fruit oblong, conical, medium, of fine quality. Season, medium.

Wachusetts. Plant upright, vigorous, hardy, moderately productive ; almost thornless. Fruit small to medium, roundish oblong ; quality fine and sweet. Season, medium.

Western Triumph. Plant upright, very strong and vigorous, and very productive ; very thorny. Fruit medium, oblong, round, of good quality. Season, medium. One of the best market varieties.

Wilson's Early. Plant upright, rather weak, hardy, but not very productive. Fruit large, oblong, round , quality good. Season, early to medium.

Wilson Junior. Plant spreading, trailing on the ground : some canes measure eleven feet ; propagates partly by tips and partly by suckers ; hardy but not productive. Fruit medium, oblong, conical, sweet. Season, medium.

CHERRIES.

Notes on Varieties, by L. Woolverton.

(Grimsby Station.)

The summer of 1899 has been exceptionally favorable to the cherry. The continued dry weather in May and June has prevented the germination of the cherry rot, so that varieties like Napoleon and Yellow Spanish, which usually spoil in a wholesale way from this fungus, have this year ripened perfectly ; and have had such unusual firmness of texture that they would keep a couple of days if necessary, and carry to a more distant market than usual in good condition.

The crop also set unusually well, and was very little subject to blasting, so that each tree yielded wonderfully, giving quite a bit of encouragement to cherry growers.

Another favorable condition was the healthy foliage, being almost free of aphis, which has been a curse of late years. No doubt the increase of the natural enemy of this insect, the ladybug, has been the secret friend, eating up this pest.

Early Purple was the first variety in our collection to ripen. Some of the trees were very sparsely loaded, but one tree, four years planted, was literally loaded, carrying about six quarts of fruit. The usual fault of this cherry, that it is badly eaten up by birds, was not so noticeable this year, and most of the fruit hung well until quite black. The first ripe fruit was about June 8th, and the last about the 20 h. When well ripened the Early Purple is very dark in color and a delicious cherry, but in our experience it cannot be relied upon to carry to ripeness even a fair crop of cherries. It is doubtful if it would be of much value to plant as a market variety.

Governor Wood followed closely upon Early Purple. The first ripe cherry was about the 14th of June, but the main crop was gathered about the 20th. The fruit was finely colored, firm, free from rot, and the yield exceptionally good. The fruit continued to hang until about the end of the month, improving all the time in flavor. This and all the other light colored oxheart or Bigarreau cherries sell at a lower price than the blackheart cherries. This cherry deserves more money than the others, because of its superior flavor. Yield of forty-year-old tree about 75 quarts.

Rockport Bigarreau ripened unusually well this season. This is the most subject to rot of any variety in our collection, other years, but during 1899 we have hardly lost a single cherry with this fungus. Every averted shower that threatened ruin to other garden truck, was salvation to this cherry, and we gathered a fine crop off a forty-year-old tree. The coloring and flavor has been good, though not nearly equal in quality to Governor Wood. The season is about the same as Wood, but the flesh is much firmer, being a Bigarreau. We do not recommend this variety for the commercial orchard.

Coe's Transparent. Gathered June 21; season, June 18th to 30th, 1899: yield of tree forty years planted, 84 qts. The quality is fine, and firm enough to ship when picked a little on the green side. No rot and no curculio —so that the packing was a pleasure, for every cherry counted. Usually, however, this cherry is too tender for distant shipment.

Cleveland. Ready for gathering about July 1st. The first cherry ripe enough for eating was ready about June 15, along with Governor Wood, but it hangs longer, is of firmer flesh, midway in this respect between the Hearts and the Bigarreaus It seems to have a very long season. It takes on a wonderfully handsome red cheek, and its flavor excels almost any cherry in my collection, possessing a delightful aroma. A four-year-old tree yielded about four quarts.

May Duke. Every year this cherry gains in favor. The first ripe cherries were ready about the 18th of June, and the last about July 5th, thus covering a good long season. Yield of a four-year-old tree, about eight quarts; the tree had a very upright habit, and bears fruit closely along the whole length of the branches, which has a very peculiar habit of uneven ripening, sometimes a single branch being quite green when the rest of the tree is fit for gathering. Gathered first for pies on June 23rd, a little in advance of Early Purple.

Rockport gave a magnificent yield, but this was the first time it has done so in years, owing to rot, which usually takes more than half the crop. The trees were carefully sprayed with Bordeaux mixture the early part of the season, about three applications, viz.: 1st, before blossom opened, once after the bloom fell, and once about two weeks later. The dry months of May and June, however, had more to do with the freedom from rot than any other agency, and had the season been wet no doubt we could not have gathered one half the crop.

Knight's Early Black. Season 1899 from 20th to 30th. Yield from a tree 35 years planted was 132 quarts. The fruit is always born in scattered ones and twos, and not as subject to rot as some other varieties which grow in close clusters. The yield this year was heavy; the stalks hold a little more firmly to the tree than Tartarian, making it a little harder to gather.

Yellow Spanish. Gathered July 3rd to 4th in 1899. Yield, though usually very subject to rot and blast, so that the yield is very slim, this season there was none of either, and a full crop was harvested. The color and size was unusual also, so that the little baskets full looked like so many baskets of little apples. The best selling cherries in 1899 were Tartarian, Napoleon and Spanish.

Royal Duke and Late Duke are two magnificent varieties of pie cherries. The Royal Duke ripened from 1 to 12 July; yield of four-year-old tree, about ten quarts. There were a good many blasted cherries, and the flavor was rather ordinary compared with Late Duke. Late Duke ripened about 28th June and continued about two weeks; it colored beautifully, and the cherries hung closely along the branches, and the picking was easy and rapid. The yield was about 12 quarts; the fruit is clean, bright and of fine flavor. The fruit of both these varieties is larger and later than May Duke, but a little inferior in flavor.

Choisy bore about two quarts at four years of age. The fruit was scattered on the tree, and the variety appears to be too unproductive for profit. The cherry grew to a good size this season, and showed no rot or curculio. The flavor was sweet, rich and delicious; among the best for dessert purposes. Ripe from 28th June to 10th July.

Hortense on four year old tree, exceptionally fine. Yield about six quarts of largest size fruit. The very finest for cooking cherries, and very good for dessert. Would recommend it for the home garden rather than for market, as the flesh is very tender. Fruit clear of rot or curculio. Ripe June 28 to July 12.

Ohio Beauty. A medium sized cherry, of bright red color, and fine flavor for dessert purposes. Too small for profit. Ripe June 28th to July 12th.

Orel 28 resembles Early Richmond in appearance of fruit and in tree. The fruit ripens a few days later, a stem even shorter, and cherry if anything smaller. Ripe June 25th to July 5th.

Montmorency Ordinaire. Four year old tree produced about 1 quart. Ripe about 1st July to 15th. Poor in productiveness in 1899. Cherry smaller than large Montmorency, and every way inferior.

Olivet. Season, June 28th to July 12th, Yield of four year old tree about two quarts. Rather soft for shipping, but otherwise one of finest of Kentish cherries. The fruit is the largest of its class, dark rich red in color, very mild acid flavor, and deserves a place in every private garden.

Elkhorn. Season, July 9th to 10th. Most productive ; this year the fruit hung over whole tree in great heavy clusters. A Bigarreau, and inferior in flavor to the Hearts, but a good seller because of its dark, almost black color. Flavor slightly bitterish. Not much rot in 1899, but some years very subject to it and it often takes the whole crop.

Elton. Ripe June 22 to July 5th. Those left hanging on 5th July very tender and delicious ; flavor peculiar to itself. On whole this cherry was below its proper size in 1899.

Belle Magnifique appears to be a most desirable late variety. In 1899 it did not begin ripening until July 12, by which time Richmonds and Morellos were both harvested. A fine cooking cherry. The tree appeared to be fairly productive and of good quality for cooking. A Duke.

Eugenie is a most excellent Duke cherry. The tree grew vigorous and upright, and was heavily loaded. A tree 4 years planted yielded about six quarts. The fruit began ripening about the 20th of June and hung until about the 15th of July, becoming almost black toward the last. The resemblance between this and the May Duke is very strong.

Notes on Varieties, by M. Burrell.

(Niagara Station.)

The extremely dry weather of June was unusually favorable for the harvesting of the cherry crop. Not nearly as much rot obtained as during the previous season. Our Early Richmond orchard of some 130 trees turned out over 350 baskets of excellent quality, many of the trees, now 10 years old, producing four, and even five, baskets to the tree. Montmorency also yielded well, the fruit of this variety being of a large and firm character. May Duke—Six of these trees, 11 years old, yielded 32 baskets of exceptionally fine sample. The cherry is large, of beautiful color and with a fine flavor of sub-acid character. The one tree that was left unsprayed had a slight amount of rot, the others being entirely free. This is a bad variety to rot in a wet season, and needs careful and systematic spraying. Napoleon Bigarreau, Gov. Wood and Knight's Early Black did well amongst the sweet varieties. The black aphis was not so bad as last year, but this insect, the worst enemy of the grower of sweet cherries, must be fought vigorously and very early in the season. One pound of whale oil soap to seven gallons of water, mixed hot, or strong tobacco water, one pound to three gallons, whith two ounces of whale oil soap added, were amongst the most satisfactory remedies.

CURRANTS.

Notes on Varieties, by A. W. Peart.

(Burlington Station).

Currants were a heavy crop of splendid quality. The fruit was unusually large, and the bushes are in a healthy, thrifty condition. Prices, too, were high enough to leave a fair profit, which has not been the case with currants before for several years. The currant worm was destroyed by spraying with hellebore. There was no mildew on the bushes.

Belle de St. Giles.—Bush, upright, spreading, healthy, a moderate grower ; not very productive. Berry, red, very large, of fine flavor. Season, medium.

Black Victoria.—Bush, upright, medium vigor, only moderately productive. Berry, black, large and sweet. Season, medium to late,

Brayley's Seedling.—Bush, upright, spreading, vigorous and productive. Berry, red, medium size and very acid. Season, medium.

Champion.—Bush, upright, spreading, very strong and vigorous, and moderately productive.

Berry, black, very large and somewhat acid in flavor. Season, one of the latest of the black varieties.

Cherry.—Bush, strong, vigorous and very productive. Berry, dark red, large to very large, and acid in flavor. Season, early to medium. One of the most profitable currants.

Collin's Prolific.—Bush, upright, a very rank, strong grower, but so far not very productive. Berry, very large, black and acid flavor. Season, late.

Fay's Prolific.—Bush, upright, spreading, a moderate grower and productive. Berry, red, large to very large and less acid than the Cherry. A profitable market variety. Season, medium.

Lee's Prolific.—Bush, upright, spreading, moderately strong and very productive. Berry, black, very large, acid. Season, medium to late. A good commercial currant.

Naples.—Bush, upright, strong and vigorous, and very productive. Berry, black, large and acid. Season, medium to late. One of the best market varieties.

New Victoria.—Bush, upright, spreading, a vigorous grower, but not very productive. Berry, red, medium, of good flavor. Season, early to medium.

North Star.—Bush, upright, spreading, moderately vigorous and not very productive. Berry, red, large, sprightly and good flavor. Season, medium.

Pomona.—Bush, upright, spreading, moderately strong. Berry, red, large, of good flavor. Season, medium.

Raby Castle.—Bush, upright, strong, vigorous and very productive. Berry, red, medium and acid. Season, medium. A good commercial variety.

Red Cross.—Bush, upright, spreading, medium vigor and moderately productive. Berry, medium, flavor good. Season, medium.

Red Dutch.—Bush, upright, strong, healthy and productive. Berry, small to medium, flavor good. Season, early to medium.

Red Victoria.—Bush, upright, strong, vigorous and very productive ; bunch very long and large. Berry, bright red, medium to large, and fine quality. Season, medium. A good commercial currant.

Saunders.—Bush, upright, strong and vigorous, but not very productive. Berry, black, arge, sub-acid in flavor. Season, medium to late.

Versailles.—Bush, upright, spreading, moderately vigorous and fairly productive ; bunch long. Berry, red, medium, not so acid as the Cherry. Season, early to medium.

White Grape.—Bush, upright, spreading, of medium vigor, productive. Berry, white, very large and fair in quality, somewhat acid. Season, medium.

White Imperial.—Bush, upright, spreading, medium vigor and moderately productive. Berry, white, large, of fine quality. Season, medium.

Wilder.—Bush, upright, vigorous and very productive. Berry, red, large, of good quality. Season, medium. A most promising variety.

GOOSEBERRIES.

NOTES ON VARIETIES, BY STANLEY SPILLETT.

(*Gooseberry Sub-station.*)

Downing, *Pearl*, *Champion*, *Success*, *Oregon*, *Jumbo* and *Red Jacket* were entirely free from mildew this season, but at least one-third of the crop fell off prematurely. Every fallen berry contained a grub.

Pearl and *Champion* gave the largest crop. Pearl averaged six quarts to the bush with two quarts on the ground. Champion gave about the same, but being picked green did not have so many fallen berries.

The berries of Champion are fully grown two weeks' earlier than any other variety in my collection so get picked while green. Two years ago this variety midewed badly, but never since or before.

Success is in all respects a Downing.

Red Jacket and *Oregon Jumbo* are very much alike in vigor, foliage, color and shape of berry, The berry of Oregon Jumbo is a little larger than those of Red Jacket. When picked just as they commence to turn red they look well in the basket.

Of the pure foreign varieties Green Chisel is the most vigorous making five to six inches of wood. The berry is green and of first class flavor.

Ingram's Ocean, *London*, *Lanceolet*, *Red Champagne Whinhams Industry* don't grow enough wood, but the fruit is large and excellent in flavor.

Among the acclimatised varieties and seedlings from them, Whitesmith is hard to beat. This variety gave a fine crop of large yellow berries and made a growth of twelve inches of new wood (not suckers), but mildewed badly, though the fruit did not rot as formerly but ripened up perfectly.

Queen Chautauqua and *Large Golden Prolific* are very much alike in every respect. Yielding a fine crop of large yellow berries and made from eight to ten inches of new wood.

Crosby's Seedling gave three quarts per bush of very large red berries, and made one foot of new wood and a liberal supply of it.

Lancashire Lad gave one quart of luscious red berries, but is a poor grower.

Dominion gave two quarts per bush of yellow berries, resembling Whitesmith, and made from ten to twelve inches of new wood and plenty of it. Berries mildewed badly.

Columbus gave four quarts of large yellow berries which mildewed less than any other of the large varieties, except Ontario, and made abundance of new wood.

Ontario gave four quarts of berries to the bush. These berries were all very large, no small ones. The fruit and foliage of this variety were only slightly effected with mildew. So far this is a very promising variety.

Autocrat gave four quarts of large green berries, very sweet when ripe, and made a large growth of new wood.

This is the third large crop this variety has given in succession, Berries mildewed, but foliage very little.

Mrs. Whittaker gave a few berries and made a good growth of wood.

Carnie's Golden yielded fine berries, but is sprawling and a poor grower.

None of the large varieties dropped their fruit, their thick skin being a sufficient protection.

GRAPES.

Notes on Varieties, by M. Pettit.

(Wentworth Station.)

The experimental vineyard at this station was very badly injured by the very low temperature when the ground was bare last winter. Some varieties were entirely root killed, but fortunately nearly all had been tested long enough to find that many of them could not be profitably grown in comparison with the leading market varieties.

Varieties of Little Commercial Value.—The following is a list of those which are of little or no value, and, judging from my experience with them, should not be planted : Amber, Bell, Beauty, Carman, Centennial, Elicand, Empire State, Etta, Eaton, Esther, Golden Drop, Geneva, Herbemont, Lutie, Lady Washington, Monroe, Martha, Mason Seedling, Maxatawney, Montefiore, New Haven, Oriental, Oneida, Olitie, Poughkeepsie Red, Pearl, Rommel, Taylor, Triumph, Transparent and Ulster Prolific. I can find no other use for the above list than to help fill the nurseryman's catalogue and perhaps his pocket.

Wine Grapes.—The following list could be profitably grown for wine ; they are strong growers, productive and have suffered very little, if any, from root killing : America, Arnolds, Bacchus, Canada, Elvira, Greins Golden, Herman. Mo. Riesling, Noah, Marion.

The following described list as far as tested appear to be of some value :

Amber Queen. Bunch medium, shouldered berry oblong, holds well to the bunch ; amber colored ; flesh, tender and rich. Ripens with the Concord.

Brilliant. Bunch long, berry medium size ; dark red ; fine flavor ; strong grower, productive. Ripe first week in September.

Colerain. Bunch long, rather loose ; berry very large, oval ; white ; flaver good ; vigor medium.

Cambridge. Bunch large, shouldered ; berries large, black, oval ; thin skin. Ripens a few days earlier than Concord.

Dr. Collier. Large black, resembles Concord in appearance and flavor. Not quite as early ; productive.

Early Ohio. Bunch medium size, shouldered ; black ; rather acid ; better quality than Champion. About as early. Vine not as vigorous.

Early Victor. Bunch compact, shouldered ; berry round, black ; with heavy bloom. Adheres well to the bunch, juicy and sprightly ; very productive. A little earlier than Concord.

Moore's Diamond. Bunch compact, very large ; white ; good flavor. Vine not quite vigorous enough. Ripens a few days earlier than Niagara.

Opal. Bunch medium size, compact ; berry large ; white. Resembles Niagara. Tough skin. Flavor medium. Vine very vigorous.

Presley. Bunch below medium, compact ; berry dark red ; fine flavor. Vine vigorous. Ripe first week of September.

Watt. Bunch medium ; berry dark red ; oval ; very spicy and rich. Vine lacks vigor. Ripe second week in September.

Woodruff Red. Bunch medium, campact ; berry large ; oval : bright red and very handsome ; quality fair. Ripe first week in October. Very productive.

The above described varieties are valuable, and some of them may take a place with the old

reliable kinds, such as Worden, Concord, Delaware, Lindley, Wilder, Agawam and Niagara. We are much in need of a grape as early, hardy and productive as Champion and of good quality. Campbell's Early may take the place.

NUTS.

Notes on Varieties, by M. Burrell.

(Niagara Station.)

A further experience with the Japanese chestnuts confirms one in the opinion that it is unwise, if not useless, to attempt the transplanting of grafted trees of considerable size. Except in the case of the Spanish varieties no vigor of growth has been obtained at all, and it is extremely doubtful if Ridgely, Early Reliance, Alpha and others planted in 1896 and 1897 will ever make desirable trees. Greater success may be looked for by planting the chestnuts themselves or by grafting or budding young native chestnuts on the premises, where subsequent transplanting can be done under the most favorable conditions. The seedlings which were budded last fall and alluded to in last year's report, have made firm, stocky trees where the buds took. This spring those which had failed were crown-grafted. Budding, if done in time and if the season is not too dry, should be fairly successful. The Japan Mammoth and Parry's Giant chestnuts which were sent to the station this spring have most of them grown and are now from 15 to 20 inches high. Some of these were planted in the blanks of the experimental row of chestnuts and the rest in a nursery row. The Japanese walnuts are in a thrifty, healthy condition, and the English filberts have also made excellent growth.

PEACHES.

Notes on Varieties, by M. Burrell.

(Niagara Station.)

This fruit was the one which suffered most severely from the cold of last winter. In many orchards in the district from thirty to fifty per cent. of the trees were killed outright and others badly injured, very few orchards indeed escaping more or less damage. The losses were chiefly amongst trees up to five years old. On the high lands the losses were nearly as great as on lower levels, and nearly all varieties were injured. Neither was it a case of late ploughing contributing to the trouble, as, in the experimental plot which was ploughed and seeded down with crimson clover in the last of week July, a very large number of young trees were killed. Amongst those varieties in which all three trees were killed were, Chair's Choice, Early Michigan, Bilyer's Late, Jacques Rareripe. Elberta and Crosby. Amongst those suffering a little less were, Fitzgerald, Lorentz, Early York Tyehurst, Globe, Wonderful, Red-cheeked Melocoton, Shumaker and Triumph. Some of the varieties which escaped were, Louis Seedling, Morris White, Ostrander Late, May's Choice, Steadly, Troth's Early, Golden Drop, Thurbert, Lord Palmerston, Waterloo, Champion, Conkling, Susquehanna, Hortense Rivers, Bokhara, Home Chief, Marshall, Greensboro', Rosier, La Grange.

None of the experimental trees have yet fruited, so that no notes can be appended as to yield, quality, &c.

Thinning work was again carried out on a block of Hynes' Surprise trees, 5 years old, with markedly beneficial results. From four to eight hundred peaches were taken off each tree when about the size of hickory nuts, the cost per tree averaging about 10 cents,

Curl-leaf was scarcely to be seen in the orchards this year. Test rows were selected in the experiment block and the Bordeaux mixture and Whitewash treatments both applied, but so little "curl" appeared, even on the untreated trees, that it would not be safe to draw conclusions from the experiment.

Notes on Varieties, by M. Pettit.

(Winona Station.)

Some of the newer varieties of peaches planted in 1897 fruited this season.

The *Sneed* ripened earliest; a little larger than the Alexander; not as good flavor; too tender and juicy to ship well.

Greensboro. Large greenish-white with red cheek like Early Rivers, but richer and sweeter; ripe August 1st.

Triumph. A very early yellow peach. It resembles Barnard in size and appearance; ripe first week in August; yield, one basket to the tree.

Fancy Favourite. A fine, large, white-fleshed peach ; ripe August 8th ; yield, 15 quarts to the tree.

Fitzgerald. Large yellow, resembling Crawford ; yield, 10 quarts to the tree.

The peach trees were sprayed with Bordeaux mixture before the buds opened, and again after the blossoms dropped, leaving ten trees unsprayed, which showed a considerable more leaf curl than the sprayed trees.

Notes on Varieties, by W. W. Hilborn.

(South-Western Station.)

I scarcely know how to begin my report for this season, the two or three weeks continuous cold weather during the month of February wrought such sad havoc among the peach orchards that to look in any direction you choose, ruin and destruction is to be seen on every hand. Trees planted on soil most suitable to the growth of the peach suffered most. About 90 per cent. to 95 per cent. of all peach trees of all ages were killed. We had about 20,000 trees, most of them planted from five to nine years. Out of this number not more than 1,500 survived. A neighbor had 4,200 large bearing peach trees that had been well cared for and in splendid shape when they went into winter quarters. Out of this number he has only two trees that were not killed. Last spring about 1,000 acres of peach orchards was to be seen from the top of my house, at present there is not 50 acres of them remaining.

The trees were killed at the root. The top was not injured. They came out in full bloom. All varieties gave promise of the largest crop of fruit ever grown in this district when the top only was examined. But, alas, the roots were destroyed and in a few days after the blossoms began to open the trees began to succumb to their sad fate. Trees that escaped were those that had been planted in soil that for some reason did not dry out with the long-continued cold period. It was not the severe cold, but the long-continued cold that did the mischief. In the autumn of 1898 the wood and fruit buds of the peach ripened up perfectly, and went into winter quarters in the best possible condition.

During the month of February we experienced about three weeks of continuous severe cold. About 14° was the lowest point reached on the ridge or high land. On lower lying land several degrees lower were recorded. When frost first enters the soil it expands and excludes the air from the roots. But long-continued frost dries out the soil, then it contracts and admits the air. This drying-out process while the roots were frozen was no doubt the cause of the trouble. There was no snow at the time to prevent the frost from penetrating to a great depth. Deep cracks were quite numerous in the soil, caused by the contraction from long-continued cold. The frost penetrated from two to three feet deep.

A small portion of the experimental plot was saved, principally of the last planting. This portion of the orchard had been sown quite early to Crimson Clover. Weeds also came up very numerous, together they made a sufficient mulch to protect the trees. Other portions of the orchard which had been cultivated better and less weeds came up with the crimson clover did not escape. Some orchards escaped with less injury that had been planted on low land or where quicksand was comparatively near the surface. This will no doubt induce others to plant on similar land, which will no doubt be a mistake, as trees on such soil are more liable to suffer from the changes in temperature which occur near y every winter. Peach trees planted on low, rich, or moist soils do not usually produce fruit of the best quality. The trees make such a rapid rank growth that the fruit does not colour up properly and they are therefore of poor quality. On such soil they also grow so late in the autumn that they do not properly ripen up their wood and fruit buds, hence, are more susceptible to injury from the cold of winter. All varieties suffered about the same by last winter's frost. In some cases it would appear that some kinds escaped better than others, but when you examine those same varieties in other portions of the orchard you find perhaps every tree killed, while some other sorts considered more tender may remain. Everything goes to show that something prevented the soil from drying out where trees escaped, whether that was the grass weeds or the natural dampness of the soil.

I have not enough kinds left to give a satisfactory report on varieties this season. Those kinds that did survive were many of them more or less injured, and in many instances the fruit either dropped early or ripened prematurely. The following notes on a few of the newer varieties are all I can supply that would be of value to the planter.

Oscar's Black Prince, received from Monroe, Mich., much like Alexander in character, ripens a week or ten days later. Very much darker in colour and perhaps a little better in quality. Not desirable for a market sort.

Engols Mammoth, Large, nearly round, suture slight. Yellow, with red cheek. Flesh yellow, sweet and juicy. Stone small, free. Ripens between the two Crawfords. Keeps well after picking. Tree healthy, vigorous and productive. Very promising for both home use and market.

Pearce. Fruit large, golden yellow, flesh yellow, good flavor, ripens on or after the middle of September. Judging from this seasons fruiting it promises to be a valuable market sort.

Connecticut, from Hale, Conn. This variety is of the early Barnard type, of which it is probably a seedling. Not equal to that old standard variety this season. Unless it does better in the future it cannot be recommended for market, as there is so many better kinds ripening at the same season which is about with Barnard.

Bronson. Large yellow, with red cheek, flesh yellow, sweet, good, very promising market variety. Ripens middle to the last of September.

New Prolific. Fruit large, golden yellow, with crimson cheek, flesh golden yellow, very good, pit small, freestone. Tree vigorous, healthy and productive. Ripens just after early Crawford, very promising for market.

Namaper. A variety received from Stark Bros., Mo. Tree a good, healthy, vigorous grower, and appears to be hardy. Fruit large, oval, about the size and form of Elberta, rather better quality, and ripens a week or ten days later. Very promising for market.

Bokara. This variety, as I have it, is worthless. It is very small, white flesh, ripening with Salway.

Lorentz A medium size yellow peach of good quality, ripening after Salway, too late to be valuable in Canada.

PEARS.

Notes on Varieties, by M. Burrell.

(*Niagara District*)

The pear crop turned out better than was anticipated. At this station Sheldon, Lawrence and Beurré Clairgeau were lighter than usual, but Tyson, Seckel, Clapp, Bartlett, Keiffer, and Bosc yielded well. Blight was again in evidence on the Clapp's Favorite, and in spite of some good qualities, we hesitate to recommend the extensive planting of this variety. Tyson, though of vigorous and productive habit with fruit of good quality, is not highly desirable for commercial purposes owing to the small size of the fruit. The young pear trees on the experimental plot have nearly all made a good healthy growth. The pear slug did comparatively little damage in the district this season.

PLUMS.

Notes on Varieties, by A. W. Peart.

(*Burlington Station.*)

Plums were a fine crop of excellent quality ; 800 trees, ranging from three to seven years old, yielded 1,625 twelve quart baskets. There was little or no rot, and the fruit was of a good size. Of the Japan varieties Ogon, Burbank, Abundance and Wickson promise to have a commercial place, not on account of their quality, but their fine showy appearance and seasons of ripening.

Abundance (Japan). Tree, an upright, strong grower. Fruit yellow, with reddish-crimson flush, large, oblong, round ; quality only fair. Season, middle of August. Fruits very young. Promises well for an early market plum.

Bradshaw. Tree upright, strong grower, hardy, moderately productive ; does not bear very young. Fruit large, oblong-oval, reddish purple ; flesh rather coarse ; quality good. Season, late August.

Burbank (Japan). Tree spreading, unshapely, irregular, but strong and very productive ; bears very young. Fruit medium to large, oblong-round, with red crimson flush ; quality only fair. Season, middle of August. A very promising early variety.

Berckman (Japan). Tree upright, spreading, medium vigor. Fruit medium to large, dark red ; flesh very soft ; juicy ; quality poor ; oblong-oval. Season, late July.

Chabot (Japan). Tree spreading, strong grower. Fruit yellow, with slight crimson flush, slightly oblong, medium size ; quality only fair. Season, early September.

General Hand. Tree upright, spreading, very vigorous, hardy ; not very productive. Fruit very large, roundish-oval, yellow. Season, middle of September.

German Prune. Tree irregular, upright, spreading grower, moderately vigorous, hardy and productive. Fruit medium, purple, oblong-oval ; one side heavy. Season, September. A good market variety.

Glass' Seedling (Quackenbos). Tree upright, spreading ; a very vigorous grower, hardy, and very productive when it gets a little age. Fruit purple, large, roundish oblong ; quality good. One of the best commercial varieties.

Guii. Tree upright, moderately vigorous and very productive. Fruit purple, medium to large, oblong-oval ; quality good. Season, September. A good commercial plum.

Hudson River Purple Egg. Tree upright, spreading, very vigorous and very productive.

Fruit purple, very large, irregular oblong-oval ; quality first-class ; shows a tendency to rot ; should be picked slightly immature. Season, late August.

Imperial Gage. Tree upright, spreading, vigorous and very productive. Fruit yellowish green, medium to large, oval ; distinct suture ; quality excellent. Season, early September. A good market or garden variety.

Ireland's Seedling. Tree spreading, moderate grower, hardy and productive. Fruit medium size, almost round, crimson-purple ; quality excellent. Season, middle of August.

Italian Prune. Tree upright, spreading, moderate vigor, hardy and moderately productive. Fruit oblong-oval, with heavy side, reddish-blue, medium. Season, September.

Lombard. Tree upright, spreading, somewhat tender, very productive ; begins bearing young ; probably the most prolific of the older varieties here. Fruit medium, roundish oval, purple-red. Early September. One of the most profitable market varieties.

Marianna. Tree upright, spreading, very strong and rampant grower. A good shade tree but no use for fruit. Fruit red, small, roundish-oval, soft flesh, thick skin, poor in quality. Season, early to middle of August.

Monroe. Tree upright, spreading, vigorous, hardy and productive. Fruit medium, oval, yellow. Season, early September.

Niagara. Tree upright, strong grower, hardy and moderately productive. Fruit oblong-oval, large, reddish-purple does not bear very young. Tree and fruit resemble the Bradshaw very much, both in habits and peculiarities. Season, late August.

Ogon (Japan). Tree upright, strong grower, and promises to be productive. Fruit medium, yellow ; roundish oval ; quality only fair. Season, late July early August, a few days later than the Berckman. A promising new, very early variety.

Peter's Yellow Gage. Tree upright, spreading ; moderately vigorous, hardy and productive. Fruit medium, roundish-oval, yellow ; middle of August.

Pond's Seedling. Tree upright, spreading, vigorous, hardy and productive. Fruit very large, oval ; yellowish purple-red. Season, middle of September.

Prunus Simoni. Tree an upright, only moderate grower, somewhat tender and but moderately productive. Fruit large, roundish flat ; crimson-red ; short stem, adhering closely to the wood; quality poor. Season, August.

Prince of Wales. Tree upright, spreading, vigorous. Fruit yellowish-crimson ; roundish, oval, medium. Season, early September.

Purple Egg. Tree upright, spreading, strong grower, hardy and very productive. Fruit medium, oval ; dark purple. Season, September. A good commercial plum.

Reine Claude. Tree upright, spreading, somewhat tender, moderate grower, hardy and very productive. Fruit medium, roundish oblong, very meaty and firm ; sweet, rich ; one of the best plums for canning or preserving. Season, late September, early October. A very profitable orchard plum.

Staunton. Tree, an upright, strong grower, hardy and productive. Fruit medium, roundish-oblong, bluish purple, firm, of excellent quality. Season, early October. A profitable late plum.

Shropshire Damson. Tree spreading, hardy and productive. Fruit small, oval, dark purple ; quality fine. Season, late September, early October.

Smith's Orleans. Tree upright, spreading, vigorous, somewhat tender. Fruit medium to large, roundish oval, bluish bloom, reddish purple. Season, late August.

Shippers Pride. Tree upright, moderate grower, productive. Fruit oblong-ovate, purple, medium size. Season, September. A good commercial plum.

Satsuma (Japan). Tree strong, spreading grower. Fruit medium to large, roundish-conical, dark red, firm flesh ; poor quality. Season, late September. Does not promise well. A curiosity on account of its dark-red flesh.

Saunders. Tree upright, spreading grower, moderately vigorous, hardy and very productive. Fruit roundish oblong, small, yellow, juicy, sweet, melting. Season, early to middle of August.

Washington. Tree upright, strong, vigorous and moderately productive. Fruit large, deep yellow, sometimes with a crimson cheek ; quality fine. Season, late August.

Wickson (Japan). Tree upright, strong. Fruit large, roundish conical, yellowish crimson-red. Season, early October. A promising plum.

Yellow Egg. Tree upright, spreading, moderate grower, productive, somewhat tender. Fruit large to very large, yellow, oval. Season, late August, early September.

Yellow Gage. Tree upright, spreading, vigorous and very productive. Fruit roundish oblong, yellow, juicy, rich. Season, middle of August.

Notes on Varieties, by John G. Mitchell.

(Georgian Bay Station.)

Last winter was the most severe we have experienced for many years. However, we had nothing killed outright except four dwarf Duchess pears, which were in a position very much

exposed to the full sweep of the winds, which blew the ground bare, and they were probably frozen dry. The buds on some varieties were killed, or very much weakened ; but these facts are of great importance in determining the hardiness of varieties. Lombard, Coe's Golden Drop, Reine Claude, Glass Seedling, Yellow Egg, Diamond, Moore's Arctic, Arch Duke, Grand Duke, Monarch and Kingston were about the only varieties of plums bearing a full crop.

Best Selling Varieties.—The experience of another fruit season still further proves the fact that the markets want only the large, smooth, clean, showy varieties ; for there seems to be no longer any money in growing small plums. The best selling kinds this year were: Washington, Bradshaw, Glass, Quackenboss, Pond's Seedling, Coe's Golden Drop, Reine Claude, Diamond, Arch Duke and Grand Duke. The last three are new fruits here and very promising.

Blaugh. Scions from Daniel B. Hoover, Esq., Almira, York county, Ont. Origin, Alleghany Mts. Tree, a strong upright grower. Leaves, large, glossy and very distinct, like Washington. Fruit, larger than medium, two inches long by one and one-half inches wide ; a smooth, clean, handsome plum. Color, light purple, covered with a beautiful light blue bloom, becomes darker as it gets riper. Flesh, yellow, juicy. Stone, cling. Quality, good. Season, September-October. This promises to be one of the best late colored plums.

Diamond. A strong upright grower. Fruit, medium to large, two inches long, one and one-half inches wide. Suture, distinct. Color, black, covered with a heavy blue bloom. Flesh, yellow ; a little coarse ; juicy. Stone, cling. Very handsome, excellent bearer and good shipper. Very profitable. Season, late September.

Kingston. Very like Diamond in every respect, so much so, indeed, that one would take them to be the same tree and fruit, there being but a very slight difference in the foliage.

Monarch. Tree a strong upright grower. Fruit, medium to large ; purple, covered with a heavy bloom. Fruit, yellow, juicy, slightly acid. Stone, cling. Splendid bearer ; will make a good shipper to distant markets ; very promising.

Saunders. Tree a slow grower forming a round compact head. Fruit, small, one and one-half inches long, one inch wide. Flesh, yellow. Stone, cling. Quality, good. Fruit grows very much in threes. A poor shipper and decays badly on the tree ; not a profitable variety here. Season, August.

Tatge. Hardy, very much like Lombard ; scarcely distinguishable. The latter appears the most desirable of the two. Same season.

American Plums.

Cheney. An upright, moderately strong grower. Fruit, small, round, one to one and a quarter inches. Color bright red ; very good quality for a wild plum.

Golden Beauty. Tree a very strong grower. Foliage a light golden color ; at a distance would make a pretty ornamental tree. Fruit small, yellow, conical. May be good for preserving ; too late for here ; ripe this season, just now (November 1st).

Pottawattomie. One of the most vigorous of the American plums. Tree a spreading, upright grower. Fruit one and one half inches long, one inch wide ; very pretty. Skin yellow, changing to clear bright red as it becomes ripe. Stem slender, three-quarter inch long. Good. Season, September.

Weaver. One of the best of the American sorts. Fruit inch to inch and a quarter, nearly round. Color dull red, thickly set with small grey dots.

Wyant or *Sand.* Tree a scrubby grower ; fruit about size of Weaver and scarcely so good.

Note. None of the American plums so far tested are of any practical value here, but might be useful further north, where the more tender kinds would not succeed.

Japan Plums.

These plums are proving much more hardy than was expected. The following have fruited successfully here.

Abundance. This variety has just borne its second crop after one of the most trying winters, which sufficiently proves its hardiness. The fruit is large, of good quality, and very beautiful, but too juicy in my opinion to make a good shipping plum

Burbank. A variety sent out by Luther Burbank, of Santa Rosa, California. Tree is very hardy and vigorous, but the most spreading and sprawling in its habits of growth of any tree in the orchard. As regards productiveness, it is simply unequalled. To produce the finest fruit, heavy thinning should be practiced. The quality is excellent and it should make a good canning plum, while its attractive color and good shipping qualities should recommend it as a good market variety. It ripens ten days to two weeks later than Abundance ; ripe here last week of August or first of September.

Orient. Tree a very handsome symetrical grower, fairly vigorous. Fruit about as large as Burbank and resembles that variety very much. Quality good.

Red June. This is the earliest plum we have in test. Tree a strong grower, forming a large upright well shaped top, and bears the third year. Fruit medium to large ; color bright red ; conical ; quality good. August first. Hardy.

Chabot. Tree very much like Red June in habit and growth. Fruit about same size. Skin, amber, nearly covered with dots and splashes of red ; very attractive. Season, late September.

Hale's Japan. An upright, handsome tree. Fruit larger than medium. Skin, yellow, well covered and splashed with red, giving it a most attractive appearance. Quality good. September.

Hataukis. Tree a strong spreading grower. Fruit large. Color, lemon yellow. Season, late September.

Satsuma. Tree, a strong, spreading grower, like Burbank, but not so sprawling. Fruit about the same size and color.

Ogon. Medium size Color, lemon yellow ; flesh firm, and a free stone. Quality poor. Nearly all dropped from the trees. I do not think it will be of much use as a commercial plum.

Willard. This variety, although fairly vigorous, is the slowest grower we have among the Japan plums. It is said to be a great bearer, but has done poorly with us so far. Size, medium. Color, dull red. Very early ; last of July. Quality very poor ; indeed as compared with others we regard it as of little use.

Although a good many of the Japan plums, most undoubtedly are proving sufficiently hardy, and of exceedingly attractive appearance, yet they are not the equal in quality to our best European varieties. We therefore would advise not to plant largely of Japan plums until we know still more about them.

Notes on Varieties, by M. Burrell.

(*Niagara Station*).

The plum crop has been a heavy one in the district this year, and where spraying was resorted to thoroughly, an excellent sample was the result. In the Domestica class the following gave the best yields :—Prince's Yellow Gage, Moore's Arctic, Bradshaw, Lombard, Washington, Yellow Egg, Reine Claude, Coe's Golden Drop and English Damson.

Moore's Arctic has been a good deal abused, and is undoubtedly of inferior quality. It is a fair cooking plum, however, when well matured ; and on account of its earliness hardiness and productive habit is of considerable commercial value. We took this year from nineteen ten year old trees 140 baskets, which sold at from forty to fifty cents. per basket, the result comparing very favorably with those obtained from other kinds. Lombard, for instance, though of better quality, is of a poorer color, is far more subject to rot, and comes on the market when plums are at their lowest. General Hand, a magnificent green plum, has in this section proved itself too shy a bearer to be of any commercial value. Coe's Golden Drop may be considered a valuable late yellow plum ; it is a slow grower but hardy, good quality and very productive. It is, however, very subject to rot.

Japanese Type. Out of some 150 trees, comprising about fourteen varieties only one tree was winter killed. The Japanese plums are certainly proving themselves hardier than many people expected. Abundance and Burbank cropped well this year. The claim that these varieties are not attacked by the curculio, is, of course, absolutely without foundation. Abundance I consider the best quality of any Japanese plum I know, which is not very high praise. It ripens very unevenly, necessitating some three pickings, is subject to rot and uneven as to size. It ripens with us about three days in advance of Moore's Arctic, and five or six days ahead of Prince's Yellow Gage. Burbank is of poor quality, showy appearance, large, a very heavy yielder, but particularly subject to rot. It remains to be proved how these varieties will stand the strain of ten or twelve bearing years, or whether the durability of the trees will compare at all favorably with the better varieties of the Domestica type. Vigorous thinning of the fruit should be practised, especially in the case of Burbank.

Notes on Varieties, by M. Pettit.

(*Winona Station.*)

About thirty varieties of plums were planted at this station during 1894 and '95. Most of them bore the first crop this year. It was very light on many of them, when compared with the size of the trees, also in comparison with an orchard of Lombards joining the experimental plot, planted in 1895.

Red Nigate. Ripened July 18th. A small red plum ; drop from the trees before fully ripe ; yield, four quarts to the tree ; planted in 1897.

Willard, Ripened July 20th ; about the size of Lombard ; a little darker color ; gives promise of being profitable on account of earliness and good shipping qualities ; yield, six quarts to the tree ; planted in 1894.

Ogan. Another of the earliest ; a light-coloured plum of inferior quality ; ripe Aug, 5th ; yield, seven quarts to the tree ; planted in 1894.

Abundance. Planted in 1895 ; yield, sixteen quarts to the tree.

Burbank has many good qualities for a leading market variety; early, strong, strong grower, very productive, long keeper, good shipper and of good appearance and quality.

Grand Duke is one of the most promising of the later plums.

RASPBERRIES.

NOTES ON VARIETIES, BY A. W. PEART.

(Tested at Burlington Station.)

Raspberries were a fair crop. The raspberry slug did a great deal of damage in plantations that were not cared for. I found spraying with hellebore an effective remedy. The Marlboro and Cuthbert still hold their own as profitable commercial varieties. The former however requires thorough cultivation and liberal fertilizing to keep up its vigor. During the drought the crop is very materially prolonged and increased by cultivating the soil every other morning through the picking season, thus checking evaporation, and permitting the plants to receive the benefit of any moisture there is in the soil, of the newer varieties of red raspberries the Miller and London bid fair to equal the two varieties mentioned above as commercial berries. They are both good plants, productive, hardy, and have excellent commercial qualities. We do not find either the yellow, black or purple raspberries so profitable as the red.

All Summer. Plant, upright, moderate vigor, hardy, fairly productive. Fruiting more or less from early July until late October. Fruit, red, medium size, sweet and aromatic. Not a desirable commercial variety.

Columbian. Plant, upright, strong, very vigorous, hardy, and productive. Fruit, purple, medium to large; quality, fair. Season, medium to late A promising new variety.

Cuthbert. Plant, upright, very strong, and very vigorous, hardy and very productive. Fruit, large, conical-round, bright-red, fairly firm; quality, good. Season, medium to late. One of the best market varieties.

Golden Queen. Plant, upright, strong, hardy and productive. Fruit, yellow, large, of excellent quality. Season, medium. Probably the best yellow variety.

Gregg. Plant, upright, vigorous, hardy, and moderately productive. Fruit, black, large; quality, fair. Season, medium to late.

Hilborn. Plant, upright, moderately vigorous, hardy, and very productive. Fruit, black, medium to large, of excellent quality. Season, medium. A desirable market variety.

Japan Wine. Plant, spreading, vigorous, but tender and unproductive. Fruit, small, scarlet-red, obovate-conical, very acid. Of no commercial value here, but showy and interesting on account of its Oriental appearance. Season, late.

Kansas. Plant, upright, strong, very vigorous, hardy and very productive. Fruit, medium to large, black of fine quality. One of the best market varieties here. Season, early.

Loudon. Plant, upright, strong, vigorous, hardy, and productive. Fruit, large, red; quality, good. A very promising berry. Season, medium to late.

Lovett. Plant, upright, of moderate vigor, hardy, and fairly productive. Fruit, red, medium, fair in quality. Season, medium to late.

Marlboro. Plant, upright, moderate grower, hardy, and very productive. Fruit, large, red, firm; quality, fair. Season, early. One of the best market varieties.

Miller. Plant, upright, moderately vigorous, hardy and productive. Fruit, large, red, firm quality, good. Season, early to medium. A very promising new variety.

Ohio. Plant, upright, strong grower, hardy, and productive. Fruit, black, large; quality excellent. Season, medium to late.

Older. Plant, upright, spreading, moderately vigorous, hardy and productive. Fruit, black, large to very large; quality, fair. Season, early to medium.

Palmer. Plant, upright, spreading, moderately vigorous, hardy, and productive. Fruit, medium, black, sweet. Season, early to medium.

Progress. Plant, upright, spreading, moderate vigor, hardy; not very productive. Fruit, small to medium, black; quality, good, sweet. Season, early.

Redfield. Plant, upright, moderate growth, hardy, and moderately productive. Fruit, purple, medium to large; quality, fair. Season, late.

Reliance. Plant, upright, moderate growth, hardy, and productive. Fruit, dark-red, large, of fine quality. Season, medium. A promising variety.

Shaffer's Colossal. Plant, upright, strong, vigorous, hardy, and productive. Fruit, purple, large; quality, fair. Season, medium to late. A good canning variety.

Smith's Giant. Plant, upright, very strong, and vigorous, hardy, and productive. Fruit, black, very large; quality, good. Season, late. A promising new variety.

Southegan. Plant, upright, spreading, moderately vigorous, hardy and productive. Fruit, black, large, of good quality. Season, medium.

Thompson. Plant, upright, light grower, hardy, moderately productive. Fruit, red, medium; quality, fair. Season, medium to late.

Notes on Varieties, by A. E. Sherrington.

(*Lake Huron Station.*)

Red Raspberries.

The red raspberries are grown on the hedge row system. The rows are six feet apart, and the plants were set three feet apart in the row and then allowed to fill in; each variety occupies 18 feet of the row with a space of 2 feet between each variety which is kept clean. The stake, bearing the name of variety, is in the centre of an open space. Soil, clay loam. Fertilizers used, barn manure and wood ashes. They are kept well cultivated and clean until fruit commences to ripen, then straw is spread under the plants and space between rows, which keeps the fruit clean and permits the escape of moisture. The record of yield is made from weighing, but in report it is given in quarts or boxes, allowing 16 oz. to a quart. The pruning is done in the fall by cutting out the old and weak canes, and in the spring by shortening the canes to good healthy wood.

All Summer. Plant hardy and healthy, of dwarf habit; growth 26 inches; berry, medium size; color, red; quality, fair; yield 3½ quarts, ripe July 18; not profitable.

Brandywine. An early, red variety; plant hardy; canes small and weak; growth, 36 inches; berry small and soft; quality medium; yield 6¼ quarts; ripe July 4th. This one was badly broken down by the snow

Brinckle's Orange Plant tender and weak; berry soft; quality poor; color yellow; yield 2½ quarts; ripe July 4th; growth 24 inches.

Cuthbert. Plant hardy and healthy, canes strong and vigorous, growth, 60 inches; berry large, firm, and of the best quality; color, dark red; yield, 18 quarts; ripe July 12th. This is the best all round berry grown.

Caroline. Plant hardy and healthy; fairly vigorous; growth, 45 inches; berry small and soft; quality of the poorest; yield, 23¾ quarts: ripe July 10th. Not worth cultivating.

Golden Queen. Canes strong and healthy, vigorous and hardy; growth, 50 inches; color, yellow; berry large, quite firm, and of very good quality; yield, 16¾ quarts; ripe July 12th. The best light berry.

Hansell. Canes weak and lacks vigor; color red; berry small and soft; yield, 8½ quarts; ripe July 4th. No good.

Louden. Poor grower; does not fill up the row; growth, 24 inches; color red; berry large, fine, quality very good; yield, 10 quarts. ripe July 6th. Not doing well.

Marlboro. Plant of dwarfish habit, but healthy; growth, 24 inches; berry large and firm; quality fair; color light red; yield, 11¼ quarts; ripe July 6th.

Miller. This variety is improving; plant healthy and hardy; quite vigorous, with fairly strong canes; growth, 50 inches; berry medium to large, firm and of fair quality; color light red; yield, 25 quarts; ripe July 6th.

(*No Name*). The label was lost off this variety when the plants reached me for planting, and I have not been able to identify it yet; it resembles Phœnix very much, but yields better than that variety. Plant healthy and hardy, fairly vigorous; growth, 40 inches; color bright red; berry medium to large, and firm; quality good; yield, 31¼ quarts; ripe July 12th. A good one.

Phœnix. Plant moderately vigorous, healthy and hardy; growth, 40 inches; color, bright red; berry medium to large, and firm; yield, 22¼ quarts; ripe July 12th.

Reliance. Canes rather small and weak; growth, 36 inches; color red; berry small and soft; quality only medium; yield 11¾ quart; ripe July 4th.

Rancocas. Canes too small and weak, apt to go down with the snow; growth, 30 inches; color red; berry small and soft, quality fair, yield, 5 quarts; ripe July 6th. Not worth growing.

Turner. A very hardy and healthy variety, moderately vigorous; growth, 45 inches; berry rather small, quality medium to good; valuable owing to its hardiness and early ripening qualities; yield, 24 quarts; ripe July 4th.

Thompson. An early red variety; hardy and healthy; fairly vigorous; growth, 40 inches; berry a little soft; quality fair, but not as good as Turner; yield, 13½ quarts; ripe July 4th.

White Champlain. This variety is of no use, and will be discarded. plant weak and tender; growth, 24 inches; berry white, medium size; quality fair; yield, 1½ quarts; ripe July 6th.

Zetler. This is a local berry; plant hardy and healthy; fairly vigorous; growth, 40 inches; berry medium to large, a little soft, but firm enough for near market; color light red; yield, 10½ quarts: ripe July 6th.

Black Raspberries.

The black raspberries are grown in rows six feet apart and three feet apart in the row, cultivated and fertilized the same as the red varieties. Pruning.—The pruning of the blackcaps is done by pinching off about two or three inches of the young canes when about 24 inches high, and

in the fall the old canes are all cut out close to the ground. Then in the spring the side branches are shortened back to the desired length.

Conrath. Plant strong and vigorous, appears to be hardy; two years planted. Berry large, firm, and of the best quality; yield, per six plants, 22½ quarts; ripe July 10th. A good one.

Columbia. The plant is rather a poor grower and a little tender. Berry large, firm, and of fair quality; color purple; yield, per six plants, 5 quarts; ripe July 18th. No use for market owing to its color.

Gregg. A vigorous grower, but tender; quality good; berry large, with a fine bloom: yield, per six plants, 4½ quarts; ripe July 15th.

Gault. This variety is not doing as well as expected at first; plant rather weak and tender; berry large and of fair quality; yield, per six plants, 8 quarts; ripe July 4th.

Hilborn. Plant vigorous and very hardy; berry medium to large; quality good; yield for six plants, 15 quarts; ripe July 10th. A safe one to plant.

Kansas. A good grower, not as hardy as was at first thought to be; berry large, firm, and of the best quality; yield, for six plants, 22½ quarts; ripe July 10th.

Lovett. A moderate grower, fairly hardy: berry medium, very black, with large drupes; a little soft; yield, per six plants, 6½ quarts: ripe July 6th.

Lottie. Resembles Lovett very much in growth, but the berry is smaller; quality poor; yield, per six plants, 10 quarts; ripe July 10th.

Mammoth Cluster. If this is correct the name is by far the best part of it; plant is about the poorest grower on the grounds; berry very small, hard, and of poor quality; yield, per six plants, 3 quarts; ripe July 4th. (Probably this is not the true Mammoth Cluster.—Secretary).

Ohio. A fair grower, but a little tender; berry medium size; quality very good; yield, per six plants, 11¼ quarts; ripe July 10th.

Older. Two years planted; it is of spreading habit so far; hardy; berry large and of good quality; yield, per six plants, 6¾ quarts; ripe July 10th.

Pioneer. Medium grower and hardy; berry small; quality not good; yield, per six plants, 9¾ quarts; ripe July 6th.

Progress. Very similar to Pioneer in every respect; yield, per six plants, 9¾ quarts; ripe July 6th.

Red Field. Plant a good grower and hardy; berry small and soft; of the poorest quality; color purple: yield, per six plants, 8¼ quarts; ripe July 12th. No good.

Shaffer. A strong, vigorous grower, but a little tender; berry very large; quality very good for canning; color purple; yield, per six plants, 14¼ quarts; ripe July 12th. Does not sell well owing to its color.

Smith's Giant. Very vigorous, not quite as hardy as it ought to be; berry very large; quality good; yield, per six plants, 10½ quarts: ripe July 12th. A good one.

Logan. I managed to save one plant out of six of this variety, but it has not made more than six inches of growth in two years, and of course set no fruit.

Japan Golden Mayberry. This variety is too tender for this district. It is killed down to the ground every winter; has not fruited yet.

Strawberry Raspberry. There is no killing out this variety, it continued to spread and yielded quite a crop of large fine fruit. The berry is very handsome in appearance, but the quality is extremely poor. The plant dies down to the ground every winter and comes up in spring, fruiting on the young canes, which grow to the height of about 12 to 15 inches, It is very ornamental. but will never become a market berry: yield, per 12 feet of row 2 feet wide, 20 quarts; ripe July 28th.

Notes on Varieties by M. Burrell.

(*Niagara Station.*)

The severe weather of last February, when the thermometer in this district remained steadily below zero for a whole week, touching 14 degrees below in some points affected the raspberry patches disastrously. A large percentage of the canes were killed, and a small crop resulted. The varieties planted for testing purposes here in 1897 made a fairly good showing.

Royal Church proved a good bearer, and a fairly vigorous grower. The fruit was large, moderately firm, and of excellent quality.

Loudon. Vigorous, hardy and quite productive. Berries large, with large grains, and fine red color; quality good.

Miller. Moderately productive, not a very vigorous grower, early and good quality.

Columbian. This hybrid of the Shaffer type bears out its reputation for vigor and productiveness, but the quality is not high, and the objectionable color will probably prevent its being a popular variety.

Older. Black Cap. Hardy, fairly vigorous, large in berry, and good quality, a promising variety.

Conrath. Black Cap. Early. Deep black in berry, not very firm, only a fair grower.

Smith's Giant. A strong grower and one of the best of the newer black caps. Hardy, very productive, good as to size and quality.

STRAWBERRIES.

Notes on Varieties for 1899, by E. B. Stevenson.

(*Strawberry Sub-Station*).

The season of 1899 was a peculiar one and not altogether satisfactory. The strawberry crop is variable and uncertain, although you may take every pains with soil, planting and cultivation, you are not able to tell whether the crop will be a large or small one until harvested and sold. The first part of the picking may be good, the latter part poor and unprofitable from heat and drought.

The grower of strawberries is not able to hold his crop over for higher prices and better returns, if the prices are low when he picks his crop of berries, as the grower of hay or wheat is, who sometimes after holding for higher prices accepts a smaller price than he could have obtained in the first place. The crop of strawberries is picked, sold, and used not very long after it is out of the pickers hands, so that it is not long before the strawberry grower knows what returns his strawberries are going to make.

There are many things that have to be favorable for a good crop of strawberries. Sometimes late frost will blight in one night all his bright hopes of a paying crop, or a season of hot dry weather will set in just at or after blooming time and continue until his hopes vanish into thin air.

While the strawberry crop is very uncertain from the above causes, yet the way the plants have been cared for has a great deal to do with the matter as to whether you have a paying or non-paying crop.

First you have to plant in suitable soil well enriched that will bear a good crop of anything else, as, for instance, turnips or corn ; then you have to secure good, strong, healthy plants, get them as near home as possible so that they may be planted while fresh (I plant with a spade) ; after planting they must have good cultivation, all weeds kept down, the rows confined to about sixteen inches in width, runners being cut off after that width is secured.

If plants are put in on poor soil and not cared for, or poorly looked after, and a poor growth of plants is made, no one need expect a good crop, even if all other things are favorable. But no matter how good a growth the vines have made, if no protection is given during the winter and it should be a severe one like last winter, the temperature for a week being below zero, many of the plants will be killed or seriously injured ; that the best results will not be satisfactory, as a good crop could not be obtained from such conditions.

While the winter of 1898-9 was unusually severe, those beds that had been protected came out in the spring in very good shape ; the spring was backward and cold, retarding growth, while many old beds not protected were killed out completely, and many new beds not protected were so seriously injured that very little fruit was picked from them.

The season of 1898 was not very favorable for plant-making, in many sections too dry until too late in September to secure a good row. So the plants went into winter quarters poorly provided with protection, and when not given it artificially they suffered very severely, while on beds protected, the bloom was very free and the season of blooming on the whole favorable for pollenizing, and the plants made great preparation for a large crop, but severe drought set in and greatly shortened the season,

One peculiarity about the past season was the fact that with us there were virtually no early or late kinds, all were in bloom together and all fruited together, or with very little difference in time between them. Varieties that in an ordinary or average year would be in bloom two weeks after other sorts, bloomed at the same time this year ; the early kinds were retarded by the cold, late spring.

The prices received were very fair, running from six cents to nine cents per box wholesale ; the better kinds, however, the fancy sorts, bringing from ten to twelve cents per box wholesale. This shows that it pays to grow the best kinds, for while the old common kinds were only bringing from four to five cents, these sorts cost as much to grow and more to pick, but did not bring in the market more than half the price of such varieties as Clyde, Bubach, Seaford, etc.

It may be claimed, as it is by some, that the common kinds bear larger crops ; not so. The Clyde will bear as many boxes as the most prolific small common kind, fewer berries, perhaps, but more boxes and higher prices.

There are now so many varieties that are so large and productive and fine looking and that are firm and good shippers being cultivated, that it is really too bad that some of our markets are flooded with very inferior varieties that are out of date and are not grown by the best and most progressive growers, ; which are not any more productive than the larger and better kinds, and which are so decidedly poor in appearance that many people now will not have them

at any price when they can get the better kinds. To give one instance as a sample of the above; I know of a grower who continued to grow the Crescent and Wilson and such kinds because he had the plants himself or could get them for the digging, and would not buy the better kinds, while a neighbor of his in the same village paid $5.00 per 1,000 for Bubach and Jessie plants. The next season the Crescent man could hardly get rid of his large crop and one day contracted to furnish 2,000 boxes at one and one-half cents per box, while the Bubach man had contracted his whole crop of Bubach for eleven cents per box. Thus was seen one man who could only with difficulty dispose of his crop, the other had no difficulty in getting good prices. This was in a year when there was a large crop and markets glutted with poor fruit. It would have paid the Crescent man to have let his rot on the ground at the price he was getting, one and one-half cents. The Bubach man was getting a very good return for his investment.

Had it not been this year for the very hot, dry weather that set in in fruiting time the crop would have been very large in those plots that came through the winter all right.

There was little or no rust to speak of, even on Wm. Belt, Dunn and such varieties that usually have considerable rust.

Of the older standard varieties

Bubach seems to be weakening in plant vigor. While it gave a fine crop of grand berries, the fruit stalk was shorter and the fruit closer to the ground (than I ever saw it) which is an objection.

Haverland. I believe the Haverland is just as vigorous as it ever was; plant good runner, the berry bright, glossy and long, a little light in color, but beautiful looking; on moist soils it leaves a tremendous crop, is one of the best that has been in general cultivation for the past ten years.

Clyde. I predicted some years ago when I first got the Clyde plants from its originator, Dr. Stayman, that it would take a front place, and it stands there to-day. As a large, firm, good flavored and wonderful producer, the Clyde is not and never was surpassed. The Haverland comes nearest to it of any that I have had experience with, and I have grown all the new varieties that have been offered for the past ten years, and have discarded hundreds of high-priced and much lauded kinds that I found not worthy of a place among the standards. I believe its wonderful productiveness will in time impair the vigor of the plant. The berry then will decrease in size, but at the present it easily stands at the head of the list. To secure one such variety (every ten years) as the Clyde, Glen Mary, Haverland or Seaford it is worth all the labor of testing the many worthless kinds that are offered, and when we do find one such variety among the many kinds that have one or two good qualities and perhaps thus seem great berries to their originators, but which we feel are not worth retaining, we are repaid for all the time and trouble we have spent on the discarded kinds.

Annie Laurie. (Perfect.) Is of first quality, one of the best table varieties; not productive enough for the market growers.

Bismarck. (Perfect.) It bore a very large crop of large, beautiful berries and paid well, they were so attractive looking; brought good prices.

Boynton. (Imperfect.) This variety so closely resembles the old Crescent that you cannot tell the difference. To those who want the old Crescent they will find a slight improvement in the Boynton; the fruit is almost identical with Crescent.

Brandywine. (Perfect) Did well; fruit large; fine quality; a good one; some may think it does not bear enough, but it was productive the past season.

Carrie. (Imperfect.) Resembles the Haverland very much; it bore a good crop of large, finger-shaped berries, perhaps on account of not being well fertilized; there were a good many imperfect shaped berries toward the end of the picking season.

Bubach. (Imperfect.) Too well known to need any description, only to say that it did well and held its place as a standard the past season.

Clyde. (Perfect.) Already described.

Eleanor. (Perfect.) Produced a good crop of fine berries; among the early ones; dark color; tartish; a good early kind.

Geisler. (Perfect.) Did well this season; the patch was white with bloom; it was among the first in bloom; the plant is strong and healthy, good grower; the berry is long and blunt at end; resembles the Seaford.

Glen Mary. (Perfect.) Bore a good crop of immense berries, bringing highest price; some of the berries have a hard, green, seedy end. Not the best quality, but size sells them. Plant strong, vigorous and healthy.

Greenville. (Imperfect.) So well known and widely grown and succeeded so well, no danger or risk in planting it.

Hall's Favorite. (Perfect.) Bore a good crop of fine berries, resembling the Splendid. There are others better, for instance, the Splendid is more desirable.

Jersey Queen. (Imperfect.) Did well.

Lovet. (Perfect.) Did well. This and the foregoing are so well known need no description.

Margaret (Perfect.) This is one of the later candidates for favor. This variety did well,

bearing a very large crop of the finest fruit, bringing the highest price in the market ; it is a late sort. This variety wil' repay the best cultivation ; plant good grower, strong and healthy ; very desirable sort.

Marshall. (Perfect.) This variety will not do very well ; makes only a few plants and bore only a few berries, but what it did bear were very fine. A variety that market growers will not find profitable for them to grow.

Michel's Early. (Perfect.) Did not do well here this season ; was not any earlier than many other kinds that were very much larger and finer looking.

Mastodon. (Imperfect.) Was a success. It bore a fine crop of the largest and finest berries and brought the highest prices. It very much resembles the Burbach ; same in plant growth.

Nick Ohmer (Perfect.) Did very well this season. The plant is a strong grower, perfect bloom, quite productive of large, firm, deep red berries, and I consider of very good quality. It is pushing its way to front rank ; a good market variety if treated well ; it will need good cultivation to do its best, but it will repay all the cultivation and care you may give it.

Ruby. Perfect.) Here is another good one. It produced a very large crop of best berries, firm and good quality ; the plant is a good grower and very productive ; sometimes has some rust.

Ridgeway. (Perfect.) A strong grower. Did not do as well as last year, but a good one and worthy of a trial.

Saunders. (Perfect.) Did well ; bore a fine crop of good berries of best quality ; firm and good shipper. Some a little seedy and hard at end, but sold well for good prices ; a profitable kind for market growers.

Seaford. (Perfect.) The Seaford has quickly grown into favor. It is mid-season, like the Bubach. It bore a very large number of the finest berries and best quality ; it delighted me with its behaviour this past season. The plant is strong and good grower ; the berry is quite firm ; a good shipper. This is one of the kinds when you come across it you feel repaid for all the trouble and the many disappointments you have had with the many new kinds that do not come even in sight of the good qualities their introducers claim for them. This will take, indeed has taken, a first place among profitable strawberries

Sharpless. (Perfect.) So well known needs no description. Bore some very fine, delicious berries, but not enough of them to be profitable for market grower.

Sunrise. (Perfect.) This sort did not do well this year ; is not a very desirable one, although in some soils and places it is profitable.

Splendid. (Perfect.) A good strong grower, healthy and very productive ; berries medium to large, and roundly conical ; firm and quite early ; good shipper and profitable as a market variety.

Staples. (Perfect) A good early one to fertilize early pistillates ; bore a fair crop of good berries.

Tennessee Prolific. (Perfect.) This was one of the good kinds this season as well as in the past ; bore a very large crop of medium to large sized berries, bright, nice looking, firm and a good shipper.

Van Deman. (Perfect.) The season of this variety was the largest of any kind ; produced a good crop of the finest quality ; it seems to be losing its vigor of plant ; not much earlier the past season than many others.

Warfield. (Imperfect.) A very productive ; only medium in size ; goes well with the Staples or Eleanor to fertilize ; a good shipper ; suffers very much from hot, dry weather.

Wm. Belt. (Perfect.) This is a fine variety ; bore well ; large, fine-looking berries, and of fine quality ; brought best prices in market ; the first berries very large and somewhat irregular sometimes.

Williams. (Perfect.) A good market variety, resembles the Saunders in fruit but not in plant ; about the same season ; bore a good crop of firm berries ; greatest objection, nose white and somewhat seedy.

Woolverton. Perfect.) A fine, fancy kind ; bears good crops of choicest berries, which bring the highest price of any ; it is a profitable one to grow ; plant strong and healthy.

Of the newer varieties fruiting for first or second year, the following are worthy of notice:

Bird. A seedling grown by W. F. Bird, of Michigan. The plant is a very strong, healthy one, making a wide row ; the fruit is large and roundly conical ; good scarlet color, good quality and productive.

Cobden Queen. (Imperfect.) Originated by John McCaffrey ; a seedling from seed of Wilson ; a fine, healthy, strong grower ; makes lots of ruimels ; sometimes rusts a little ; fruit round, crimson, medium in firmness ; good quality and productive ; a good medium.

Benoy. (Perfect.) This was grown and sent out by Mr. Benoy, of Indiana, from seed of Bubach and Jessie. Plant a very strong one ; a good grower, runs freely and no rust ; the fruit is quite large, crimson ; firm, good quality ; ought to do well.

Earliest. (Perfect.) After close examination, I do not see any difference between this

sort and Michel's Early. Some growers say they observe a slight difference, that the berries are more conical and not quite as high quality, but I must say I do not observe any difference in plant, fruit, time of blooming and ripening ; on these points they are in my eyes the same.

Jerry Rusk. (Perfect.) This is another seedling grown from seed of Bubach fertilized with Jessie, by Mr. Benoy, of Indiana. The plant is healthy and a strong grower ; no rust. Mr. M. Crawford says of it· "It is one of the most productive large varieties" ; another grower, "that it is the only one that will surpass the Bubach on his place." It is a good plant maker. The fruit is quite large, roundish conical, bright crimson, golden seeds, good quality and productive.

Stahaline-Fred. (Imperfect.) This is a seedling grown by Mr. Fred Stahaline, of Michigan. The plant is a very rampant grower, very vigorous and no rust on it. The fruit is round, somewhat conical in shape and large in size ; the color is bright light crimson ; good quality and productive.

Seaford. See account given above of Seaford.

Sample. (Imperfect.) Sent out by C. S. Pratt, of Massachussets. Was claimed to be "the most wonderful berry of the 19th century." The plant is a strong grower, making plants freely ; healthy, no rust. The fruit is large, roundly conical, with blunt end ; good, bright color, looking very well in basket ; only medium in firmness and poor in quality. It was quite productive, but did not bear as many as the Clyde. It is a good one and will be grown largely on account of its size and productiveness.

Star. (Perfect.) A good, strong grower. It is so very like the Sharpless, that a description of the Sharpless would describe the Star. I do not think it is any better than the Sharpless. There was no need to put on the market another such variety.

I fruited a great many more varieties that I do not consider of value enough to give them a place in my report.

New Varieties.

Of the new varieties that I have in the trial plot and that will fruit with me for first time next year, when they will be reported upon, are the following :

Bubach No. 3298. Seedling from Missouri Experimental Station. It has made a good growth of plants ; healthy and strong.

Clyde No. 800. In plant very like its parent ; strong, vigorous grower.

Crescent No. 1801. Seedling of Crescent, by the Experimental Station, of Missouri ; plant good grower, strong and healthy.

Dalling's Bride. Has made a good growth ; is reported to be very early.

Excelsior, Elba, Emperor and Empress.—Both these two latter are seedlings grown by the late John Little ; they are very strong growers, plant very large, making a good growth and free from rust.

Frederick, Gladstone, Klondike, Leo, Morgan's Favorite, Maximus, McKinley, Pride of Cumberland Varies and others, all have made a good growth in plants. They were planted on a moist, sandy loam, in good condition, and have gone into winter quarters in good shape.

Early and Extra Early Varieties.

Among the earliest to ripen were : Van Deman, Mayflower, Earliest, Michel's Early, Excelsior, followed very closely by Clyde, Eleanor, Staples, Lord Sheffield and Warfield.

Medium early to mid-season varieties : Bubach, Haverland, Tennessee Prolific, Bismarck, Seaford, Ridgeway, Glen Mary, Wm. Belt, Nick Olimer, Splendid, Ruby, Mastodon, Carrie, Brandywine.

Later Varieties—(Mid-season to Late.)

Aroma, Equinox, Margaret, Gandy, Hunn, Saunders, Williams, Woolverton.

There are a great many others that we might give a report of. Some of them of some merit, but have some serious defect, so that we have not thought it wise to burden this report with a description of them.

GENERAL NOTES.

Burlington Station.

There are 225 varieties of fruits at this station made up as follows :

Currants	22	varieties.
Blackberries	22	"
Pears	33	"
Plums	47	"
Grapes	24	"
Raspberries	28	"
Peaches	18	"
Apples	25	"
Cherries	4	"
Quinces	1	"
Mulberry	1	"

A small proportion of vines, bushes and trees were destroyed by the severe frost of February, probably not more than 5 per cent. in all. Grape vines and blackberries suffered the most severely. With this exception fruit-stocks are in good condition. Upon the whole the fruit crop has been a satisfactory one. Prices ruled exceptionally high for many lines thus leaving a substantial margin of profit. The severe drouth which began in May was practically unbroken until the 1st of October. Raspberries, blackberries and strawberries suffered in consequence, but currants and the tree fruits held their own remarkably well. Injurious insects were unusually plentiful, more especially the codling moth or apple worm, and the tent caterpillar. There was but little fungi, fruits being exceptionally clean. Spraying for leaf eating insects is a work of necessity, and is generally adopted.

Apples were a fair crop. The codling moth ravaged the fruit very badly, but it was clean and well formed.

Grapes were a good crop of excellent quality. There was little or no mildew save on a small proportion of the Brighton and Lindley.

Peaches were a good crop of fine quality.

Pears were a fair crop of excellent quality. Even the Flemish Beauty was free from the spot.

Cherries were also a good crop with exceptionally high prices.

East Central Station.

Commenced pruning orchard March 10th and finished April 12th. Sprayed 50 trees March 28th with sulphate of copper and lime.

April 15th, sprayed all orchard trees.
" 19th, " all pear and plum trees.
" 26th, " apple, pears and plums and cherries.
" 29th, " all young trees, apples, pears and plums.
May 14th, " whole orchard.
July 17th, " last time.

Results : Trees first sprayed were cleanest and largest of all and best colored fruit, I intend to spray twice at least before blooming hereafter. We did not have a nest of caterpillars in entire orchard. I should have sprayed once later than we did as the fungus or black spot appeared late in the season on some varieties. Take it all around we have from 75 to 80 per cent. clean fruit and only a few wormy and these were mostly the largest samples, proving that the early formed fruit suffered most. Our apple crop was not heavy owing largely to it being the off year with us. Boston Star, Northern Spy, Wealthy and Princess Louise were an exception, being loaded heavily and had to be thinned.

Our pear crop was the largest we have had, and some of the varieties extra size, selling all the way from $3 to $8 per barrel, which with the heavy crop proved quite profitable.

We adopted clean cultivation last year throughout our fruiting orchard and grew hoed crops among the young orchard after manuring with stable manure. The half acre devoted to crimson clover which was sown June 28, made a growth of about 12 inches and was turned under this fall the land being as loose as could be desired.

Although the young trees where the corn and roots were, made quite as good growth as those where the clover process was used.

All the young trees made a very satisfactory growth, 8 apples and ten pears had a few samples most of which were fine and well coloured.

The winter of 1898 was not a severe one, although from 28th March to 4th April, it was very cold and windy the thermometer getting down to 30 below on the 3rd April, but as there had not been much warm weather previous to that date the buds had not started and little damage was done. Fruit trees in general were a week later in blooming than usual. About 6 weeks of July and August was very dry and hot and fruit ripened too rapidly ; then on 1st September, we had a 12 hours soaking rain which gave the apples and pears a vigorous start and they rapidly increased in size till picking time.

The conclusions I have arrived at are in favor of severe thinning of young wood, early and regular spraying with Bordeaux during the growing season, severe thinning of overbearing varieties, and lastly plenty of manure and ashes where available and phosphates where manure cannot be obtained.

If these few rules are observed carefully and attended to, the results will be a large crop of No. 1 fruit, and no other kind pays to grow.

Georgian Bay Station.

Fertilizer Experiments.—This experiment was tried on one-half acre of bearing plums. Soil, deep sandy loam, in perfect condition. About July 1st, 1897, I spread about thirty-five bushels of unleached ashes and one hundred pounds ground bone. On 12th July I sowed ten pounds red clover. It was nicely up by July 20th. It made a thick growth, from eight to twelve inches, with a very heavy growth of roots. Plowed under Nov. 23rd. Results : trees the following summer had a heavier and darker foliage, fruit rather larger, better color and more bloom.

In 1898 the same half acre was again treated the same way, except that twenty-five pounds of potash was used instead of ashes, and crimson clover in place of red. The season being dry, the clover was not sown quite so early as the previous year, and therefore did not make such a heavy growth as first season, but still was very good. The plowing under in this case was not done until early spring, 1899. Clover mostly winter killed. Results : this plot was quite the equal, if not better, than the adjoining orchard ; cultivated the same way and treated with ten tons of barnyard manure per acre.

Peaches.—We have about fifteen varieties in test. While none of the trees were entirely killed, the buds were either killed or weakened so much that only a few blossoms appeared. These nearly all fell off, without setting fruit.

Pears.—Until a few years ago, it was thought Flemish Beauty was about the only pear that could be successfully grown here, but now we find pears are succeeding nearly as well as apples and plums. This season we fruited successfully, Bartlett, Clairgeau, Belle Lucrative, Buffam, Beurre d' Anjou, Duchess, Clapp's Favorite, Howell, Vicar of Wakefield, Flemish Beauty, Idaho, etc., all nice and clean.

Insects and Fungi.—We were very little troubled with insects this season ; only with caterpillars and curculio in the spring. After spraying with Paris green and Bordeaux, we had no more trouble with them.

Shot hole fungus made its appearance about August, which caused the leaves to fall from trees not sprayed.

We have sprayed twice during the summer. The trees held a healthy foliage until frost, which, I think, proves the efficacy of Bordeaux mixture for leaf blight.

Niagara Station.

I beg to submit notes dealing with the various fruits, etc., at this station. The fruit crop of this district during the past season has been decidedly better than in 1898, and on the whole prices obtained by growers have been more remunerative. Elsewhere will be found paragraphs taking up the different fruits, diseases, etc., in detail, and chronicling in a condensed form the results of the past year.

Crimson Clover.—The past winter provided extremely adverse conditions for the success of this useful plant. Nevertheless, I believe that the contentions advanced in my report last year are substantially correct. Of the three patches there referred to, the first, that is in oat stubble, was about half killed ; the remaining half made a very fair growth, and by manuring the vacant spots an excellent crop of corn was secured from the ground this year. On the second and third patches mentioned enough clover was left to form a valuable green manure this season.

HARDY FRUITS.

Algoma Station.

On the 13th of May I received a box containing 19 varieties of apples, 3 of each kind ; 3 varieties apricots, 3 of each ; 12 varieties cherries, 3 of each ; 4 varieties pears, 3 of each ; 12 varieties plums, from one to three of each ; 7 varieties strawberries, 12 of each ; 11 varieties raspberries and blackberries, 12 of each ; 10 varieties grapes, 3 of each ; 5 varieties gooseberries, 12 of each ; 4 varieties currants, 12 of each.

The stock had been good and well packed, but delayed altogether too long in transit. The apples was in fairly good condition, the pears also. Of the strawberries I have managed to save one or two plants of each variety. The cherries, considering the condition they were in when planted, have done fairly well. Of the plums a few failed ; of apples I have lost one ; pears, all alive ; apricots, all dead ; grapes made a poor growth.

The whole, being for experimental purposes, were placed on a northwest slope ; ground in good condition and exposed to n.w. wind across the lake, my object being more particularly to test the hardiness of the different varieties rather than to see how tender a variety it was possible to grow. The ground has been in root crop and kept clear of weeds during the summer, thus making a growth of from 0 to 27 inches and mostly going into winter with well ripened wood. I have but little information to give in regard to the adaptability of different varieties for this section other than you already have.

I would say plant Charlemoff for a summer apple ; it is better every way than Yellow Transparent, then Duchess, to follow up to October, perhaps the best commercial apple we have if there is a market at short distance. I have made more money out of Duchess than any other kind—then several others come in. *e.g.*, St. Lawrence is showy and good ; Gideon also, which is not subject to decay at the core here ; then Wealthy, our grand stand-by for winter ; it has a few faults, but as yet we have got nothing to equal it—in a cold cellar it will keep until March ; Golden Russet is also coming into favor, but the tree will not stand neglect. I prefer Wealthy, which will grow anywhere and on any soil, and bear fruit every year.

Pears. I do not know of one satisfactory so far. Flemish Beauty is perhaps the best. Dwarfs are no good, it is throwing money and time away to buy and plant them.

Plums, I have little experience with here. Lombard, Shipper's Pride, Duane's Purple, I have seen canning more fruit that should have been left on the tree. I would not advise planting for other than home use at present.

Cherries seem to be an eccentric fruit, largely depending on the ground on which they are grown, but such as Richmond, Montmorency and Ostheim will likely succeed. Sweet cherries are in the experimental stages yet, although I have known Black Tartarian doing fairly well planted 11 years ago.

St. Lawrence Station.

Apples.—The following apple trees fruited a few specimens, most of them imperfect, so that I cannot give a true description of the fruit for this year.

Longfield. Planted 1896. Eight apples, undersized, ripened in October.

Ontario. Planted 1896. Six apples, undersized, well colored, stung by codling moth and curculio, although injured they give promise of keeping well.

McMahon White. Planted 1896. A few specimens stolen before reaching maturity.

Milwaukee. Planted 1896. One apple, size 3x4 inches ; form and color somewhat similar to its parent, the Duchess, and give promise of keeping well.

Switzer. Planted 1897. One apple, ripe early in September and was decayed early in October.

Excelsior Crab. Planted 1897. Three apples, size $1\frac{3}{8}$ x $1\frac{3}{8}$; ripe in August.

Hibernal. Planted 1896. Two apples. Poor in quality, color and size. Ripe in October.

Pears.—Pears have done very well with me this year, better than I expected considering the severe winter of '98-'99, with no snow for protection. I lost two trees this July past that showed signs of root killing, viz., one Howell and one Baba. No blight this year, and in most cases trees that showed blight last fall are recovering.

Keiffer's Hybrid. Planted 1896. Healthy, very vigorous bloom, and matured 45 pears, rather undersized but free from blemish. Harvested October 5th, very promising.

Bessemianka. Planted 1896. Healthy, vigorous bloom. One pear dropped before maturity.

Lincoln. Planted 1896. Healthy, vigorous ; some blight in 1898, but recovering.

Japan Golden Russet. Healthy and vigor, medium blossom, buds injured by frost. The fruit buds on this variety have been injured for two winters in succession and will probably never bear fruit, but it will possibly be desirable as an ornamental owing to its handsome glossy foliage.

PLUMS.—The fruit spurs on all varieties of the European class suffered from the low temperature and high winds of February last, but leaf buds and terminal wood came through all right. There was some bloom on Weaver, Forest Rose, Forest Garden and Hanover, but no fruit set.

PEACHES.—*Bokhara.* Planted 1897. In the winter of 1897-8 the three trees were protected by stooking corn stalks around them. They winter fairly well. In the winter of 1898-99 they were left unprotected and were killed outright. Result—not hardy in this section.

APRICOTS.—*Harris.* Planted 1898. Healthy and vigorous. Wintered without injury.

INSECTS.—FUNGI, AND SPRAYING FOR 1899 ON APPLE TREES.—Tent caterpillars and forest tent caterpillars were the worst ever known in this section. Whole orchards were stripped of every leaf and many sections of the forests as well. Other insects were not quite so numerous as usual but quite bad enough to injure any fruit that was left by the caterpillars. Fungi was seen on both fruit and foliage in unsprayed orchards.

The results of spraying were entirely satisfactory with me. The first two sprayings entirely destroyed the tent caterpillars and the subsequent sprayings kept the forest caterpillars from doing any damage.

1st spraying	May 3	Bordeaux mixture		Buds opening.
2nd "	" 12	" "		Blossoms opening.
3rd "	" 27	" "		" falling.
4th "	June 7	" "		
5th "	" 21	" "		
6th "	July 4	" "		

Results on four acres of Fameuse and Scarlet Pippin, 500 bbls. of apples, 95% free from spot. Fruit of large size and classed 80% 1st ; nearly 20% good 2nds ; and a few cider apples. Stock selling at $2.00 to $3.00 per bbl. for seconds and $3.25 to $4.00 for firsts.

Plums were very free from insects and fungi. There was some aphis in the spring which was controlled by spraying with tobacco water May 3rd and 5th. Shot hole fungus was not hurtful to the trees.

Pears were particularly free from slug or other insects, but were sprayed with Bordeaux mixture in June to check the caterpillars.

CULTIVATION.—My bearing orchard of Fameuse and Scarlet Pippin was given frequent and thorough cultivation from early spring until the middle of July, at which time the land was sown to clover. Fertilizers used bone meal and muriate of potash—200 of the former and 100 of the latter per acre.

In the experimental plot the land was planted to corn and potatoes and manured with stable manure.

All my fruit trees are in a healthy condition this fall and fruit buds well developed and ripened, but in orchards where the caterpillars destroyed the foliage in June the terminal shoots are all green yet and no fruit buds. A severe winter may prove fatal to many trees.

FRUIT GROWING IN THE NORTH.

A REPORT OF A VISIT OF INSPECTION MADE BY MR. A. M. SMITH IN NOVEMBER, 1899.

Having visited several of our northern districts during the past season with a view to ascertaining what fruits, if any, could be grown with profit to the settlers there, I thought that perhaps some of my observations might be of general interest. I find that settlers in nearly all the settlements in Muskoka, Parry Sound, Nipissing and Algoma Districts have tried growing fruit of some kind to a greater or less extent ; but the majority of them have failed, simply for the reason that they did not know what varieties were adapted to their climate. Many of them, coming from Southern and Western Ontario, longed for the fruit that they had been accustomed to there, and planted Baldwin, Greening, Spitzenberg and other tender apples, sweet cherries, plums and pears, etc. Many of these were too tender north of Lake Ontario, and of course failed to grow, and they were discouraged. Others were induced by tree agents to try iron-clad varieties (so called) that would stand the climate of the Klondike, and paid exhorbitant prices, only to find themselves swindled, and were of course disgusted and gave up. Occasionally settlers in different parts secured hardy crabs and perhaps a few Yellow Transparent, Duchess of Oldenburg, Wealthy, Longfield and other hardy apples ; Early Richmond, Ostheim and some other hardy cherries, and, by caring for them, have secured fair crops, thus demonstrating that these fruits can be successfully grown in most districts. The past fall I visited St. Joseph's Island, in Algoma, and vicinity, and examined orchards over quite a large extent of country to see what effect the extreme cold of last winter had upon the different varieties—the thermometer was for several days 40 degrees below zero there.

Among those I examined I did not find one of the following :—Yellow Transparent, Duchess of Oldenburg, Wealthy, Gideon, Longfield, Alexander, Pewaukee, Scott's Winter, that appeared to be injured in the least, and most of them had borne good crops of fruit ; besides several Russian sorts and local apples, the names of which were unknown.

There was one variety there that appeared to be especially hardy and was called Charlamoff, though the fruit was all gone when I got there. It was described as a beautiful striped and mottled red apple about the size of the Duchess, a little earlier and of much better quality for eating. Besides apples, I found several varieties of cherries, including early Richmond, Ostheim and other Russian sorts uninjured, and a few pears and plums. Among the latter, to my surprise, was the Abundance, which I had always supposed would not succeed far out of the peach belt ; but here it was, and I was credibly informed had borne several crops of fruit in this district. I also found a peculiarly hardy pear tree, name unknown, which had stood the winter, borne fruit and made an immense growth. It was procured in Iowa, and described as a medium size, early pear of good quality. The Flemish Beauty and Clapp's Favorite had also stood the winter fairly well. Besides those mentioned as uninjured there were several varieties which were slightly injured and had borne considerable fruit in the past, such as Ben Davis, American Golden Russet, Wagner, Snow, Princess Louise and others.

In regard to small fruits such as strawberries, raspberries, gooseberries, currants, etc., they can be grown, I believe, even in greater perfection than farther south, as the great depth of snow in the winter protects them. Also many kinds of early grapes, that ripen before frosts, can be grown by laying down the vines in winter.

But with very few exceptions there is a great want of care of trees among the early settlers. They do not seem to understand that in order to have them succeed they need cultivation as much as any other crop, and many of their failures are simply from neglect

I did not see any San Jose Scale in my travels, but I saw more oyster-shell bark louse in one day than I ever saw in my life before. I visited the new Fruit Experimental Station established by the Government at Richard's Landing, under the supervision of Mr. Charles Young, and was well pleased with the thorough and systematic manner in which he has taken hold of the work. He has already quite a variety of fruits in bearing of his own, and when those sent him by Government mature he will be able to give planters information in regard to what to plant that will be of great value to them. I believe if such an institution had been established there fifteen years ago it would have saved thousands of dollars to that part of the country, as thousands of dollars' worth of trees are planted every year, one-half of which will never bear fruit and will be a bill of expense to the purchaser in planting and caring for them.

I have a small experimental station of my own at Powassan, in the Parry Sound District, planted a year ago last spring, and I have found the same varieties stand the winter there that did at St. Joseph's Island under about the same temperature. I found there, as here, that frequently trees are injured by the early rising of the sap on the sunny side of the tree, particularly where there is no frost in the ground, and then freezing and bursting of the bark. This, I think, could be obviated in a measure by protecting the trunks with peeled basswood or other bark or building paper wrapped around them. In conclusion, I would like to offer a little advice to northern planters, which may also be good for other sections—don't plant a tree unless you *intend* to take care of it. Secondly, carry out your *intentions.* Don't plant a tree unless you have better evidence than a tree agent's word that it will succeed in your locality. If you don't know what is best for your section enquire of the nearest fruit experimental station, or the secretary of the Fruit Growers' Association of Ontario. It is his business to answer you.

When you have decided what to plant send to some reliable nurseryman and get your stock direct from him if possible. Plant bountifully and carefully, and cultivate thoroughly until past midsummer each year, to induce an early growth, and then only enough to keep down weeds and let the wood harden up to stand the winter. Protect from insects, mice and cattle. Use common sense and diligence, and there is scarcely a farmer in Ontario who could not raise fruit enough of some kind to supply his own table. There is many a one on the great water-way to the North-west, along the shores of St. Joseph and Manitoulin Islands who might get rich in growing Duchess of Oldenburg, Wealthy and other hardy apples for the northern markets.

APPLES.—Yield and selling price of varieties at Simcoe Station, 1899.

Varieties.	Age.	Time of blooming.	Date of maturity.	Date of gathering.	Yield.	Grade per cent.			Average price.	Remarks. On conditions of cultivation, spraying, manuring, etc.
						Class 1.	Class 2.	Class 3.		
Alexander.....	7 years	May 13.....	October.. .	Oct. 15....	3 barrels....	95	5	.....	1 75	Top grafted on T. sweet, 7 years old.
Ben Davis..... .	18 "	June 1.....	May	Oct. 27....	2 "	90	10	.....	2 00	
Fameuse	22 "	May 15.....	December ...	Sep. 29....	4 " .... av. of 50 trees.	75	25	.....	2 00	
Golden Russet.....	17 to 22 years	May	April	Oct. 15 to 27	2 barrels....	80	20	.....	2 00	
Hurlburt	18 years	May	January	Oct. 15....	1½ "	90	10	.....	2 00	
Kean's Seedling ...	8 "	May	October	Sep. 20....	½ "	95	5	.....	1 75	Top grafted.
King	24 "	May	February....	Oct. 2....	½ "	90	10	.....	2 50	" poor bearer.
La Rue	22 "	June 1	February....	Sep. 30....	2 "	80	20	.....	2 00	
Mann....	12 "	May	May	Oct. 14....	1 "	95	05	.....	2 25	A fine keeper.
Northern Spy	18 "	June 1	April , ...	Oct. 28....	2½ "	85	10	05	2 50	The most valuable apple grown here.
Oldenburg (Duchess)	20 " ...	May 19.....	September ..	Aug., Sept.	3 ", ...	95	05	.....	1 40	
Pewaukee	12 "	May	March	Oct. 1....	2½ "	90	10	.....	2 25	
Ribston Pippin	8 "	May	January	Oct. 1....	1 "	90	10	.....	1 75	Top graft.
Spitzenberg	22 "	May	April	Oct, 20....	2 "	85	10	05	2 25	
Tallman Sweet.	22 "	May.....	April	Oct. 20....	3 "	90	10	.....	1 75	
Wealthy	13 "	May	December ...	Sep.	2 " ...	80	15	05	1 75	

BLACKBERRIES.—Yield and selling price of varieties at Burlington station, 1899.

Varieties.	Age.	Time of blooming.	Date of maturity.	Date of gathering (first and last).	Yield per hill, in quarts.	Average price per quart.	Remarks On conditions of cultivation, spraying, manuring, etc.
	Years.					Cents.	
Agawam	4	June 8	July 24	July 24—Aug. 10	1	8	
Ancient Briton	2	" 8	" 18	" 18— " 5	very few		
Child's Tree	2	" 8	" 17	" 17— " 6	"		
Dorchester	3	" 7	" 20	" 20— " 5	¼		
Early Cluster	4	" 11	" 22	" 22— " 10	very few		
Early Harvest	4	" 11	" 10	" 10— " 1	¼	9	
Early King	3	" 8	" 9	" 9— " 1	¼	9	Prices were good.
Eldorado	3	" 6	" 20	" 20— " 5	¼		The drouth was more severe here this season than even during 1898 The general crop was, therefore, very light, bushels of berries never reaching maturity. Not more than 50 per cent. of a full crop. The severe frost of February also destroyed a great many plants on low ground.
Erie	4	" 13	" 20	" 20— " 5	¼		
Gainor	4	" 13	" 20	" 20— " 5	¼	10	
Kittatinny	4	" 10	" 20	" 20— " 15	¼	10	
Lovett's Best	4	" 11	" 27	" 27— " 10	very few		
Maxwell	4	" 11	" 17	" 17— " 1	"		
Minnewaski	2	" 10	" 22	" 22— " 5	"		
Ohmer	4	" 11	" 20	" 20— " 5	¼		
Snyder	4	" 9	" 15	" 15— " 1	¼	7	
Stone's Hardy	4	" 8	" 20	" 20— " 5	¼		
Taylor	4	" 8	" 20	" 20— " 5	¼		
Wachusetts	4	" 8	" 20	" 20— " 10	very few		
Western Triumph	4	" 6	" 20	" 20— " 5	1	8	
Wilson's Early	3	" 13	" 17	" 17— " 5	very few		
Wilson Junior	2	" 4	" 17	" 17— " 5	"		

BLACKBERRIES.—Burlington Station, 1899.

No.	Name.	Age.	Vigor.		Productiveness.		Season. First and last.	Remarks.
			Feet of growth.	Scale 1-10.	Yield in quarts per hill.	Scale 1-10.		
		Years.						
1	Agawam	4	6	9	1	10	July 24—Aug. 10	One of the best.
2	Ancient Briton	2	4	7	very few	5	" 18— " 5	
3	Child's Tree	2	4	7	"	5	" 17— " 6	
4	Dorchester	3	6	9	¼	6	" 20— " 5	
5	Early Cluster	4	6	9	very few	7	" 22— " 10	
6	Early Harvest	4	4	7	⅛	8	" 10— " 1	Both offer well.
7	Early King	3	4	7	⅛	9	" 9— " 1	Both offer well.
8	Eldorado	3	5	8	⅛	8	" 20— " 5	
9	Erie	4	6	9	⅛	6	" 20 - " 5	
10	Gainor	4	6½	9	⅛	8	" 20— " 5	Very promising.
11	Kittatinny	4	7	10	⅛	9	" 20— " 15	One of the best.
12	Lovett's Best	4	5	8	very few	5	" 27— " 10	
13	Maxwell	4	2½	5	"	5	" 17— " 1	Cane too weak.
14	Minnewaski	2	5	8	"	5	" 22— " 5	
15	Ohmer	4	6	9	⅛	7	" 20— " 5	
16	Snyder	4	4	7	⅛	8	" 15— " 1	One of the best.
17	Stone's Hardy	4	4½	7	⅛	8	" 20— " 5	
18	Taylor	4	6	9	⅛	7	" 20— " 5	
19	Wachusetts	4	6	9	very few	5	" 20— " 10	
20	Western Triumph	4	6½	9	1	10	" 20— " 5	One of the best.
21	Wilson's Early	3	4	7	very few	5	" 17— " 5	
22	Wilson Junior	2	7	10	"	5	" 17— " 5	Canes too long and weak.

BLACKBERRIES.—Lake Huron Station.

Name.	Age.	Vigor.	Productiveness.	Season.
		Scale 1-10.	Yield in quarts.	First and last.
	Years.			
Agawam	2	7	5⅜	Aug. 5 to 22
Ancient Briton	2	7	2¾	" 5 " 14
Eldorado	2	6	4¾	" 5 " 14
Gainor	2	5	1	" 5
Ohmer	3	5	¼	" 5
Rathbun	2	5	1	" 5 " 14
Snyder	2	9	3	" 5 " 14
Stone's Early	2	10	5¼	" 5 " 14
Stone's Hardy	3	7	3½	" 5 " 14
Wachusetts	2	4	4⅜	" 5 " 12
Western Triumph	2	5	3⅜	" 5 " 22

CHERRIES.—Vigor, Productiveness and Season at Grimsby Station, 1899.

Name.	Class.	Age.	Vigor. Inches of growth. June 16, 1899.	Vigor. Scale 1-10.	Productiveness. Yield in quarts.	Productiveness. Scale 1-10.	Season. First and last.	Remarks.
Abbesse			16	7	First fruit		July 8	Yellow flesh, sweet.
California Advance		2	8	1	First fruit			juicy.
Centennial			12	3			June 16	
Choisy	Duke	4	17	8	1 quart		June 21-July 12	Too tender for ship-
Cleveland	Heart	4	15	7	3 quarts	4		ment.
Coe	Heart					6	July 15-30	
Downer's Late		4			½		July 5	Sweet, delicious.
Dyehouse		2	14	6	First fruit			
Eagle	Heart		16	7			June 28-July 5	
Early Purple			17	8				
Elkhorn	Bigarreau						July 1-15	
Elton	Heart		20	10			June 20-July 5	
Eugenie	Duke	4	17	8	6 quarts		June 20-July 10	Much resembles May
German Ostheim		2	8	1	First fruit			Duke.
Grenner Glas		2	8	1	First fruit			
Griotte du Nord								
Hortense	Duke	4	12	3	4 quarts	5	June 28-July 6	
Ida			16					
King's Amarelle		2	14		First fruit			Yellow flesh, juicy,
Knight	Heart						June 25-July 5	mild acid.
Late Duke	Duke	4			8 quarts		June 28-July 10	
Loveapple			12	3			July 8	White with red cheek
Lutovka			12	3	First fruit		July 8-15	tender, juicy and
Magnifique			10	2			July 15	good flavor.
May Duke	Duke	4	14	6	8 quarts		June 21-July 6	
Mezel	Bigarreau			6			June 25-July 5	
Montmorency	Kentish		10	2				
Morello	"	4	10	2	6 quarts		July 15-30	
Murdoch Bigarreau			16	7				
Napoleon	Bigarreau		17	8		10	June 25-30	
Ohio Beauty	Heart	4	14	6	4 quarts		June 28-July 5	
Olivet		4	12	3	2 quarts		July 1-15	
Oranien Kirsch			15	6				
Plymouth	Heart	2	10	3	First fruit			Red, delicious, sweet.
Purity		3			3 quarts	9	July 5-15	Very dark red, im-
Red May			12	3				mense load, very
Richmond	Kentish		12	3			June 15-July	small, tart.
Rockport	Bigarreau		20	10				
Royal Duke	Duke	2	8	1	First fruit			
"	"	4			6 quarts			
"Schmidt"	Bigarreau	2	22	10	First fruit		July 10-20	Fine looking, very
Shatten Amarelle			8	1	First fruit			large, black almost
Sklenka		1	6	1	First fruit			tender.
Spanish	Bigarreau		22	10			June 28-July 5	
Spate Amarelle	Kentish	1	10	2	First fruit		July 10	Bitter when imma-
Strauss Weichsel		1	10	2	First fruit			ture.
Suda		1	12	3	First fruit			Inferior to Montmor-
Tartarian	Heart	1	18	9			June 16-30	ency.
Windsor	Bigarreau			8				Shows a tendency to
Wood	Heart		18	9			June 16	rot but superior to
Wragg	Morello		10	2		10	July 15-30	Elkhorn.
								Takes lead in pro-
								ductiveness and in
								early fruiting.

CURRANTS.—Tested at Burlington Station, 1899

No.	Name.	Planted.	Vigor. Inches of Growth.	Vigor. Scale 1-10.	Per Bush. Productiveness. Yield in quarts.	Per Bush. Productiveness. Scale 1-10.	Season. First and Last.	Remarks.
1	Belle de St. Giles...	1896	6	7	2	5	July 7-30.....	Large berry but poor cropper.
2	Black Victoria	"	8	9	2⅓	6	July 9-31.....	
3	Brayley's Seedling..	"	6	7	3	8	July 9-31.....	
4	Champion.....	1895	9	10	2⅓	6	July 25-Aug. 15...	Rather too woody.
5	Cherry..	1896	7	8	4	10	July 6-30	One of the best
6	Collin's Prolific.....	"	9	10	2	5	July 20-Aug. 10..	Too much wood.
7	Fay's Prolific.....	"	5	6	2	5	July 8-31.....	
8	Lee's Prolific.....	"	7	8	3½	9	July 12-31.....	
9	Naples.....	1895	8	9	3⅓	8	July 12-31.....	One of the best.
10	New Victoria.....	1897	6	7	1	3	July 5-28.....	
11	North Star.....	1896	6	7	1½	4	July 8-31.....	
12	Pomona.....	1897	6	7	½	2	July 9-31.....	
13	Raby Castle.....	1896	7	8	4	10	July 8-31.....	One of the best.
14	Red Cross.....	"	6	7	3	8	July 8-31.....	
15	Red Dutch.....	1897	7	8	1½	4	July 5-28...	
16	Red Victoria.... ..	1896	7	8	4	10	July 8-31.....	Very promising.
17	Saunders.....	1897	8	9	1½	4	July 12-31.....	
18	Versailles	1896	6	7	2	5	July 6 27.....	
19	White Grape..	"	7	8	3⅓	8	July 8-31..... ..	Very large berry.
20	White Imperial	"	7	8	2½	6	July 8-31.....	
21	Wilder.....	"	7	8	4	10	July 8-31.....	Very promising.

CURRANTS.—Yield and Selling Price of Varieties at Burlington Station, 1899.

Varieties.	Age.	Time of Blooming. Full.	Date of Maturity.	Date of Gathering Berries. First and last.	Yield per bush, in quarts.	Average Price.	Remarks. On conditions of cultivation, spraying, manuring, etc.
Belle de St. Giles...	3 years	May 9	July 7	July 7-30.....	2	Red Currants, 5c per quart, Black, 7c.	Red and Black Currants were an exceptionally fine crop, both in quality and quantity. Prices, too, were well maintained, and left a fair margin of profit. Good clean cultivation, sprayed with hellebore, and used stable manure and "Thomas" phosphate.
Black Victoria.....	3 "	15	9	9-31.....	2⅔		
Brayley's Seedling..	3 "	12	9	9-31	3		
Champion	4 "	16	25	25-Aug. 15..	2⅓		
Cherry.....	3 "	9	6	6-30	4		
Collin's Prolific.....	3 "	16	20	20-Aug. 10..	2		
Fay's Prolific.....	3 "	12	8	8 31.....	2		
Lee's Prolific.....	3 "	16	12	12-31	3½		
Naples	4 "	16	12	12-31	3⅓		
New Victoria..	2 "	10	5	5-28	1		
North Star..... ..	3 "	9	8	8-31.....	1½		
Pomona.....	2 "	11	9	9-31	½		
Raby Castle.....	3 "	8	8	8-31.....	4		
Red Cross	3 "	8	8	8-31.....	3		
Red Dutch.....	2 "	10	5	5-28.....	1½		
Red Victoria.....	3 "	9	8	8-31..... .	4		
Saunders.	2 "	16	12	12-31.. ..	1½		
Versailles	3 "	9	6	6-27.....	2		
White Grape.	3 "	10	8	8 31.....	3⅓		
White Imperial	3 "	9	8	8 31.....	2½		
Wilder.....	3 "	9	8	8-31.....	4		

GOOSEBERRIES.—Vigor, productiveness and season at Gooseberry sub-station, 1899.

No.	Varieties.	Age.	Vigor.		Productiveness.		Season. First and last.	Remarks.
			Inches of growth	Scale, 1 to 10.	Yield in quarts.	Scale, 1 to 10.		
1	Autocrat	9	12	8	4	8	July 10 to 25	This is the only large variety that has given three consecutive crops.
2	Champion	6	15	10	6	10	June 20 to 30	
3	Chatauqua	5	8	7	3	7	July 5 to 20	
4	Carne's Golden	5	5	5	1	5	" 5 to 15	
5	Crosby's Seedling	5	12	8	3	8	" 10 to 25	
6	Crown Bob	5	6	7	2	6	" 10 to 25	
7	Columbus	5	12	8	4	8	" 10 to 25	
8	Cook's Eagle	3	4	5	1	5	" 10 to 25	
9	Downing	13	12	8	5	9	" 20 Aug. 5	
10	Dominion	3	10	7	2	6	" 10 to 25	
11	Golden Prolific	4	5	5	1	5	" 10 to 25	
12	Green Chisel	3	5	5	1	5	" 20 to 30	
13	Ingram's Ocean	3	5	5	1	5	" 20 to 30	
14	Keepsake	3						
15	Lancashire Lad	3	5	5	1	5	" 5 to 20	
16	Large Golden Prolific	4	12	8	4	8	" 10 to 20	
17	London	3	5	5	1	5	" 10 to 15	
18	Lanceolot	3	5	5	1	5	" 10 to 15	
19	Mrs. Whittaker	3	10	7	3	7	" 15 to 20	
20	Oregon Jumbo	4	15	10	5	9		
21	Ontario	4	12	8	4	8	" 20 to 25	Very promising.
22	Pearl	7	13	9	6	10	" 20 Aug. 5	
23	Phœnix	4	8	7	1	5	" 15 to 20	
24	Queen	5	8	7	3	7	" 20 to 25	
25	Red Jacket	4	15	10	5	9	" 20 to 30	
26	Red Champagne	3	5	5	1	5	" 15 to 20	
27	Success	3	12	8	5	9	" 20 Aug. 5	
28	Triumph	5	8	7	3	7	" 15 to 20	
29	Whitesmith	7	12	8	4	8	" 20 to 25	
30	White Crystal	6	13	9	6	10	" 20 to 30	
31	Whinham's Industry	7	5	5	1	5	" 20 to 30	
32	Yellow Scotch	4	12	8	3	7	" 25 to 30	

GRAPES.—Yield and selling price of varieties at Wentworth Station, 1899.

Varieties.	Age.	Thinning—per cent by hand or accident.	Date of maturity.	Date of gathering. (berries, first and last.)	Yield.	Grade. Per cent.			Storage.		Date of decay.	Average price	Remarks. On conditions of cultivation, spraying, manuring, etc.
						Class 1.	Class 2.	Class 3.	Average price.	Temperature.			
	Years				lbs.				Cts.				
Agawam	12	Not thinned	Oct. 20	Oct. 25	19				2½				The cultivation, etc., has not been varied enough to make any perceptible difference. The season and natural condition of the soil and location appears to make a greater difference than cultivating or manuring.
Brilliant	4	"	Sept. 12	Sept. 12	11				2				
Black Delaware	4	"	" 15	" 20	3½								
Brighton	17	"	" 6	" 6	16				2				
Cambridge	4	"	" 6	" 12	12½				1½				
Colerain	4	"	" 6	" 12	10				1½				
Concord	25	"	" 12	" 20	22½				1½				
Catawba	16	"	Oct. 22	Oct. 25	20				2½				
Dr. Collier	4	"	Sept. 12	Sept. 12	9½				1½				
Delaware	25	"	" 5	" 12	15½				3				
Early Ohio	4	"	" 1	" 5	6				2				
Lindley	12	"	" 10	" 15	18				2½				
Moyer	13	"	" 5	" 8	8½				3				
Niagara	16	"	" 18	" 25	24				2				
Opal	3	"	Oct. 6	Oct. 6	11				1½				
Presley	3	"	Sept. 5	Sept. 5	10½				1½				
Rochester	3	"	" 12	" 12	7				1½				
Salem	17	"	Oct. 15	Oct. 20	16½				2				
Wilder	17	"	" 15	" 20	15				2				
Worden	17	"	Sept. 6	Sept. 11	16				2				
Watt	4	"	Oct. 18	Oct. 18	8				1½				

We had no mildew, all picked as one grade, except a very few culls left on vine.

All were sold about as soon as picked.

RASPBERRIES.—Tested by A. E Sherrington at Lake Huron Station.

Name.	Age.	Vigor. Inches of growth.	Vigor. Scale 1 to 10.	Productiveness. Yield in Quarts.	Productiveness. Scale 1 to 10.	Season. First and last.	Remarks.
	Yrs.						
All Summer	3	26	4	3⅕	3	July 18 Aug. 1	Not worth growing
Brandywine	3	36	7	6¼	4	" 4 " 29	
Brinckle's Orange	3	24	4	2⅕	1	" 4 to 21	Not profitable.
Cuthbert	3	60	10	18	8	" 12 Aug. 9	
Caroline	5	45	8	25⅝	9	" 10 " 5	Berry too soft.
Conrath	2	.....	10	22½	9	" 10 to 27	A good one.
Columbia	5	.....	7	5	4	" 18 Aug. 2	Not doing well.
Golden Queen	3	50	9	16⅝	8	" 12 " 5	Best yellow berry.
Gregg	3	.....	9	45	5	" 15 to 27	A little tender.
Gault	2	.....	7	8	5	" 4 to 20	
Hilborn	3	..	10	15	8	" 10 Aug. 1	The surest berry.
Hansell	3	36	6	8⅕	5	" 4 " 5	No good.
Kansas	3	.....	9	22½	9	" 10 to 27	A good one.
Lovett	3	....	7	6½	4	" 6 to 27	
Lottie	3		7	10	6	" 10 to 27	
London	3	24	4	10	6	" 6 Aug 7	Lacks vigor.
Marlboro	3	24	4	11⅕	7	" 6 " 5	
Miller	3	50	8	25¼	9	" 6 " 9	Doing well.
Mammoth Cluster	5	..	4	3	2	" 4 to 21	No good.
No Name	3	40	7	31¼	10	" 12 Aug. 9	A very fine berry
Ohio	3	.....	7	11¼	7	" 10 to 27	But do not know the correct name.
Older	2	.....	7	6⅝	5	" 10 to 27	
Pioneer	3	.....	6	9⅝	6	" 6 to 27	
Progress	2	.....	6	9¼	6	" 6 to 27	
Phœnix	3	40	8	22½	9	" 12 Aug. 9	A good late berry.
Reliance	3	36	6	11½	6	" 4 to 31	Not vigorous enough.
Rancocas	3	30	4	5	4	" 6 to 29	Weak.
Red Field	3	.....	8	8⅛	5	" 12 to 27	No good
Shaffer	3	.....	10	14¼	6	" 12 Aug. 2	Not good for market
Smith's Giant	3	.....	10	10⅜	8	" 12 to 26	A good one.
Turner	3	45	8	24	9	" 4 to 31	Very hardy.
Taylor	3	.....	8	16⅜	7	" 4 to 19	
Thompson	3	40	7	13½	7	" 4 to 31	Doing very well.
White Champlain	3	24	4	1½	2	" 6 to 21	No good.
Zetler	3	40	8	10½	7	" 6 Aug. 5	A local berry.

PEARS.—Tested at Burlington Station, 1899.

Varieties.	Age.	Vigor. Inches of growth.	Vigor. Scale 1-10.	Season. First and last.
	Years.			
Anjou	19	10	4	Nov.-Dec.
Bartlett	19	10	4	Sept.
Bartlett Seckel	1	10	4	
Beurre Bosc	3	18	10	
Beurre Giffard	3	18	10	
Buffum	2	12	5	
Clairgeau	3	12	5	Nov.
Clapp's Favorite	10	15	7	Aug.
Doyenne Boussock	3	16	8	Sept.
Duchess	10	10	4	Oct. Nov.
Easter Beurre	3	15	7	
Flemish Beauty	19	11	5	Sept.
Howell	3	16	8	Sept.-Oct.
Idaho	3	15	7	
Josephine de Malines	3	16	8	
Kieffer	3	18	10	Oct.-Nov.
Lawrence	3	20	10	Dec.
Lawson	3	18	9	
Lincoln	2	20	10	
Louise Bonne	2	12	6	Sept.
Osband's Summer	2	11	6	
Petite Marguerite	3	20	10	Aug.
President Drouard	2	15	8	
Seckel	2	12	6	
Sheldon	10	12	6	Oct.-Nov.
Souvenir de Congres	3	15	8	Aug.-Sept.
Sudduth	2	12	6	
Summer Doyenne	3	15	8	
Tyson	2	18	9	
Vermont Beauty	3	12	6	
Wilder	3	18	9	
Winter Nelis	3	12	6	Dec.

Very little blight or scab this year. A fair crop of clean, fine pears.

PEARS.—Yield and selling price of varieties at Burlington Station, 1899.

Varieties.	Age.	Time of blooming.	Date of Maturity.	Date of gathering.	Yield in quarts per tree.	Grade per cent.			Storage.	Average price.
						Class 1.	Class 2.	Class 3		
Anjou	19 years	May 12	Nov.-Dec.	Oct. 5	48	50	40	10	Packed in boxes and shipped when picked, to the Old Country some of the 1st class; the rest in barrels to Montreal: 2nd class in barrels to Montreal.	$3.50 per bbl. No. 1 and 2.
Bartlett	19 "	" 15	Sept	Sept. 1	64	45	35	20		$1.00 net per box No. 1; $3.00 per bbl. No. 2.
Clairgeau	3 "	" 15	Nov	Oct. 6	2	.....	.....	.....		
Clapp's Favorite	10 "	" 15	Aug	Aug. 20	32	70	30	.....		50c per basket.
Duchess	10 "	" 11	Oct.-Nov	Oct. 1	16	50	35	15		$3 00 per bbl. No. 2; retur net in for boxes.
Flemish Beauty	19 "	" 15	Sept	Sept. 5	64	40	40	20		45c. per bskt.
Howell	3 "	" 14	Sept.-Oct	Oct. 1	2	.....	.....	.....		
Kieffer	3 "	" 15	Oct.-Nov	Oct. 7	4	50	40	10		40c. per basket.
Lawrence	3 "	" 12	Dec	Oct. 15	1	.....	.....	.....		
Petite Marguerite	3 "	" 15	Aug	Aug. 15	2	.....	...	.....		
Sheldon	10 "	" 11	Oct.-Nov	Oct. 5	32	60	30	10		45c. per basket.
Winter Nelis	3 "	" 18	Dec	Oct. 15	1	.....	.....	.....		

PLUMS.—Tested at Lake Huron Station.

No.	Name.	Age.	Vigor.		Productiveness.		Remarks.
			Inches of growth.	Scale 1 to 10.	Yield in Quarts.	Scale 1 to 10.	
..	Abundance	4	36	9	12	8	Perfectly hardy.
..	Burbank	4	60	10	12	8	" "
..	Bradshaw	2	20	6	.....	.....	Not fruiting yet.
..	Coe's Golden Drop	3	30	8	.....	.....	" "
..	Duane's Purple	3	15	5	.....	.....	" "
..	Field	4	40	9	.....	.....	" "
..	Grand Duke	2	36	9	.....	.....	Somewhat winter killed.
..	Hale	2	36	9	.....	.....	Not fruiting yet.
..	Imperial Gage	4	18	6	.....	.....	
..	Lombards	4	36	9	45	10	
..	Moore's Arctic	4	18	6	35	9	
..	Monarch	2	30	8	.....	.....	
..	Niagara	2	20	5	.....	.....	
..	Prince Englebert	3	36	9	.....	.....	
..	Quackenboss	3	30	8	.....	.....	
..	Spaulding	4	30	8	.....	.....	
..	Satsuma	2	60	10	.....	.....	
..	Shipper's Pride	4	50	9	.....	.....	
..	Victoria	4	18	6	.....	.....	
..	Wickson	2	36	9	.....	.....	Badly winter killed.
..	Yellow Egg	2	36	9	12	8	

RASPBERRIES —Tested at Burlington Station, 1899

No.	Name.	Age.	Vigor.		Productiveness.		Season. First and last.	Remarks.
			Feet of growth.	Scale 1 to 10.	Yield in Quarts.	Scale 1 to 10.		
		Yrs.			p'r hill			
1	All Summer	4	3	5	$\frac{3}{4}$	7	July 8	Ripens until Oct.
2	Columbian	4	$5\frac{1}{2}$	9	1	9	" 10 to 31	
3	Conrath	2	3	5	$\frac{1}{4}$	3	" 8 to 30	
4	Cuthbert	4	$6\frac{1}{2}$	10	$\frac{3}{4}$	8	" 8 to 30	One of the best.
5	Gault	2	$5\frac{1}{2}$	9	$\frac{1}{2}$	5	" 8 to 30	
6	Golden Queen	4	5	8	$\frac{3}{4}$	7	" 8 to 30	
7	Gregg	3	5	8	$\frac{3}{4}$	6	" 10 to 31	
8	Hilborn	4	4	7	$\frac{3}{4}$	7	" 8 to 30	
9	Japan Wine	3	5	8	$\frac{1}{3}$	4	" 25	
10	Kansas	4	$5\frac{1}{2}$	9	1	9	" 3 to 24	Very promising.
11	Kenyon	3	$3\frac{1}{2}$	6	$\frac{3}{4}$	7	" 8 to 30	
12	Lotta	3	5	8	$\frac{3}{4}$	7	" 10 to 31	
13	Loudon	3	$4\frac{1}{2}$	8	1	9	" 8 to 30	Very promising.
14	Lovett	4	4	7	$\frac{3}{4}$	7	" 10 to 31	
15	Marlboro	4	$3\frac{1}{2}$	6	$1\frac{1}{2}$	10	" 3 to 24	One of the best.
16	Miller	2	3	5	1	9	" 3 to 29	Very promising.
17	Mills	2	$4\frac{1}{2}$	8	$\frac{3}{4}$	7	" 9 to 20	
18	Ohio	3	6	9	$\frac{3}{4}$	8	" 10 to 31	
19	Older	4	5	8	$\frac{3}{4}$	8	" 3 to 24	Very promising.
20	Palmer	4	5	8	$\frac{3}{4}$	8	" 3 to 29	
21	Phœnix	2	3	5	$\frac{3}{4}$	7	" 10 to 31	
22	Progress	4	$4\frac{1}{2}$	8	$\frac{1}{2}$	5	" 3 to 24	
23	Redfield	3	4	8	$\frac{3}{4}$	7	" 10 to 31	
24	Reliance	3	$3\frac{1}{2}$	6	$\frac{3}{4}$	8	" 3 to 24	
25	Royal Church	2	7	10	$\frac{3}{4}$	7	" 10 to 31	
26	Shaffer's Colossal	4	5	8	$\frac{3}{4}$	7	" 10 to 31	
27	Smith's Giant	3	$6\frac{1}{2}$	10	$\frac{3}{4}$	8	" 13 to 31	
28	Souhegan	3	$3\frac{1}{2}$	6	$\frac{3}{4}$	7	" 8 to 31	
29	Thompson	4	3	5	$\frac{1}{2}$	6	" 3 to 24	
30	Winant	2	$2\frac{1}{2}$	4	$\frac{1}{4}$	3	" 13 to 30	

ANNUAL REPORT

OF THE

SUPERINTENDENT OF SPRAYING

FOR

ONTARIO

1899

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF
THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS AND BOOKBINDERS, 68 AND 70 FRONT STREET WEST.
1900.

REPORT

OF THE

SUPERINTENDENT OF EXPERIMENTAL SPRAYING.

1899.

To the Honorable John Dryden, Minister of Agriculture for Ontario :

I am able to report that the Experimental Spraying of fruit trees, which has been conducted by the Department of Agriculture during the past five years, has again been productive of satisfactory results, both in attendance and in the results obtained in the different orchards, as may be seen by examining the record of sprayings. As in former years, the work was done regularly at thirty points scattered over the Province. It was intended to reduce the number of stations, but requests for the work were so urgent that it was found impossible. In addition to this an extra man had to be sent a couple of trips to a point which could not be included in the regular routes.

The territory was divided into three routes :—Mr. Jos. McPherson taking the Western, Mr. T. A. Walker the Central and Mr. J. B. Pettit the Eastern.

Each orchard was visited six or seven times.

One solution was used for all the applications—Bordeaux mixture, according to the following formula :

Copper sulphate	4 pounds
Fresh lime	4 pounds
Water	40 gallons

To this was added in every case 4 ounces of Paris green.

The following plan of spraying was followed as closely as possible :

First spraying : When the buds are swelling.

Second spraying : Just before the blossoms open.

Third spraying : When the blossoms have fallen.

Spraying at intervals of about twelve days until the danger of scab is past.

The attendance was largely in excess of any previous year.

In 1896 the attendance was 1,833; in 1897, 2,801; in 1898, 3,538; in 1899, 4,618.

This growing attendance illustrates the increased interest being taken in the work. Last spring it was impossible to respond to all the requests for stations, and at the close of the season this year there are 65 applications for the work on file.

Systematic spraying is being taken up all over the country in the wake of the experimental work, nor is this the only beneficial result of the Government's efforts, for now that the people's attention has been drawn to the unsatisfactory condition and results obtained from their orchards and the causes for the same, a general cleaning up and improvement is noticeable.

A good object lesson of the results of spraying was given at the Industrial Exhibition at Toronto. The owners of orchards where experimental work was done were invited to select and forward samples of sprayed and unsprayed fruit of the same varieties which would fairly represent the results of the work. The following gentlemen responded and supplied fruit as requested : Messrs. J. Mogk, Tavistock ; D. M. Halliday, Chesley ; R. Johnston, Havelock ; J. Crawford, Bethel ; G. Lambert, Thornbury ; J. Elmhirst, Keene ; D. Snider, Elmira ; R. Haney, Alliston ; A. H. Crosby, Markham ; John Dance, Wiarton ; A. Head, Milford ; J. Lewis, Mildmay ; H. McCormack, Paris ; D. Gellander, Wellington ; H. Wilson, Caledon East ; M. Harrison, Shelburne ; J. Ranton, Palmerston ; R. E. Hemphill, Listowel ; H. Martin, Clanbrassil ; J. Semple, Tottenham ; J. M. McNab, Southampton ; W. F. Weir, Prince Albert ; Jos. Sandy, Omemee. The contrast between the sprayed and unsprayed fruit was very striking. Some were incredulous and believed that the selections were not fairly made. An extract or two from letters received bears on this point. Mr. H. McCormick, Paris, writes :—

"You will think some of the unsprayed ones are very uneven in size but I could not help it."

Mr. Jos. Sandy, Omemee, writes :—

"More contrast in appearance of the trees than in the fruit."

Mr. Jos. Ranton, Palmerston, writes :—

"I was afraid to send an honest exhibit for fear the people would not believe it possible to secure such results."

Probably the most striking contrast, and the one most criticized, was in the exhibit of Mr. J. Dance, Wiarton, but an inspection of his orchard fully justified the selection.

I have to thank the public press for many courtesies in publishing notices and results of meetings, and for many favorable notices of the work.

There are men throughout the Province who are keeping their orchards free from tent-caterpillars and canker worms ; but they complain that their neighbors do not, and that they suffer from this neglect. The same complaint applies to the codling moth, especially in the Southern sections of the Province, and the case is more serious as there are several broods of codling moth in a season. A large part of the land in that section is devoted to fruit growing, so that one orchard is easily infested from another. Many fruit growers think that we should have legislation compelling all owners of orchards to keep them free from tent-caterpillar, canker worm and codling moth. The Ontario Fruit Growers' Association has decided to ask for amendments to the "Yellow and Black Knot Act," making it applicable to the spraying and bandaging of apple and pear trees for the destruction of the codling moth. The buyers appreciate more than ever the advantages to be derived from handling sprayed fruit, and I do not know of a single buyer who is not now an advocate of spraying.

Some years ago the claim was made that sprayed fruit was larger, cleaner, better colored, better flavored and that it possessed better shipping and keeping qualities than unsprayed fruit. This was a sweeping claim certainly, but one which has been fully proven by the records of experimental work.

One gentleman told me that he had in one shipment to Britain, this fall, both sprayed and unsprayed apples. The sprayed arrived in splendid condition and brought satisfactory prices, only one barrel being slack. The unsprayed fruit was reported slack, wet and wasty and did not pay the freight. This was especially gratifying, as he was not inclined previously to favor spraying.

One of the largest growers and most extensive shippers in Ontario, who until this season would have nothing to do with spraying, told me recently that he had made up his mind that he would have to adopt spraying or give up growing.

Following is a record of sprayings, giving, 1st, Agents' notes as the work was done, 2nd, Results ascertained by myself on inspecting the orchards in the fall, and 3rd, Letters from the owners of the orchards stating their opinions of the results in their orchards.

W. M. Orr, Superintendent.

Fruitland, Jan. 2d, 1900.

RECORD OF SPRAYINGS.

Thornbury, Grey Co.—Mr. Geo. Lambert's Orchard.

1st application, May 4th.—Fine, buds not fully open yet ; great numbers of aphis and tent-caterpillar; trees otherwise healthy.

2nd application, May 17th—Could not spray on account of rain

3rd application, May 31st.—Threatening rain ; blossoms have just fallen ; trees look well.

4th application, June 12th.—Threatening rain ; the havoc of the tent-caterpillar in many orchards in this part of the country is dreadful.

5th application, June 27th.—Fine ; the trees and apples in our plot are in first-class shape.

6th application, July 11th.—Fine ; foliage and fruit on sprayed trees very superior to that on the unsprayed trees.

I inspected Mr. Lambert's orchard and found the following results :

King,—Sprayed, 89 per cent. clean. This tree is 23 years old and gives its first clean fruit this year.

Canada Red.—Sprayed, 93 per cent. clean, heavy load ; unsprayed, 20 per cent. clean, most the fruit dropped off.

Snow.—Sprayed, 84 per cent. clean ; unsprayed, 4 per cent. clean.

Greening.—Sprayed, 92 per cent. clean ; unsprayed, 4 per cent. clean.

Astrachan.—Sprayed, 99 per cent. clean ; unsprayed, 50 per cent clean.

Cayuga Red Streak.—Sprayed, 88 per cent. clean ; unsprayed, 57 per cent. clean.

Spy.—Sprayed, 96 per cent. clean ; unsprayed, 18 per cent. clean.

Alexander.—Sprayed, 85 per cent. clean ; always scabbed before.

Irish Peach.—Sprayed, 75 per cent. clean ; never fit for use before.

On Nov. 23rd Mr. Lambert writes :—

"With great pleasure I write the results of the Government spraying in my orchard this season. In the spring when the agent came upon the scene my orchard was infested with all all kinds of insects, especially the forest tent-caterpillar. At the first application the pest was checked, and the general tone of the orchard was good, foliage good and fruit mostly set well. In gathering and packing every variety sprayed showed a marked advantage, scarcely any scale and much less codling moth than on the unsprayed trees.

In all the varieties sprayed I would say there was an average of 80 per cent to 90 per cent. of clean fruit. I feel convinced that spraying properly done will pay better than any work on the farm.

STAYNER, SIMCOE CO.—MR. L. A. PATERSON'S ORCHARD.

1st application, May 5th—Fine, tent-caterpillars very numerous; this is a fairly good orchard, but is rather old and needs scraping and pruning.

2nd application, May 18th—Unsettled; about half of the trees were in full bloom and could not be sprayed; there are tent caterpillars and canker worm on the unsprayed trees, but the sprayed trees are clean.

3rd application, June 1st—Fine; apples will be a light crop here.

4th application, June 14th—Rained all the afternoon.

5th application, June 28th—Rained all day. Mr. Paterson will spray when it clears.

6th application, July 12th—Fine; sprayed trees are almost free from spot and looking well.

I inspected Mr. Paterson's orchard and found the following results:

Spy.—Sprayed, 76 per cent. clean.

Snow.—Sprayed, 72 per cent. clean.

Greening.—Sprayed, 80 per cent. clean; unsprayed, 40 per cent. clean, dropped most of its fruit.

Baldwin.—Sprayed, 76 per cent. clean; unsprayed, 28 per cent. clean.

ALLISTON, SIMCOE CO.—MR. ROBT. HANCY'S ORCHARD.

After the first application in the orchard selected it was decided to have the work done in Mr. Hancy's orchard, as the one previously selected had very few varieties and was not bearing this year. On the second trip the day was wet and the trees in full bloom.

1st application, May 30th.—Threatening rain; bud moth and tent caterpillar bad in this locality.

2nd application, June 12th.—Sprayed after heavy rain; trees in very good shape; canker worm and tent-caterpillar very bad in unsprayed trees; many orchards have been completely stripped by them.

3rd application, June 26th.—Fair; this orchard fairly free from scab.

4th application, July 10th.—Fine; quite a noticeable difference between the sprayed and unsprayed trees.

This orchard is nearly all early fruit, and was harvested before I inspected the orchard. However, Mr. Hancy says the results were satifactory, about 80 per cent. of the sprayed fruit being clean, and the sprayed foliage in good condition. He also says that his snow apples are fit to use for the first time in many years.

On Nov. 27th, Mr. Hancy writes,—

"Regarding my orchard prior to spraying I may say that the fruit was getting worse every year,—small, misshapen and full of grubs—but this year, after spraying, there is a wonderful difference in the size and condition of the fruit, also in the leaves, which were large and healthy looking, while the trees I left unsprayed were worthless, fruit small and scabby, leaves curled and of a brown color. I am convinced if all fruit growers would spray, we would soon be rid of those pests."

TOTTENHAM, SIMCOE CO.—MR. JOHN SEMPLE'S ORCHARD.

1st application, May 2nd.—Fine; plenty of tent-caterpillar and aphis; these trees are not very large but are healthy looking; they stand in sod and should be pruned.

2nd application, May 15th.—Fair; a few of the trees could not be sprayed to-day as they were in full bloom.

3rd application, May 29th.—Very heavy rain immediately after spraying: tent-caterpillar and bud moth bad on unsprayed trees, but sprayed trees are clean.

4th application, June 10th.—Fine; fruit is not setting well, probably on account of so much wet weather; canker worm is working on unsprayed trees.

5th application, June 24th.—Fine; sprayed trees looking well.

6th application, July 8th.—Threatening rain; a few codling moth at work and a little scab appearing; there will be very favorable results in this orchard.

I visited Mr. Semple's orchard and found the following results:—

King.—Sprayed, 80 per cent. clean; unsprayed, 40 per cent. clean; the unsprayed tree dropped its fruit badly.

Twenty Ounce Apple.—Sprayed, 89 per cent. clean; unsprayed, 68 per cent. clean.

Harvest.—Sprayed, 96 per cent. clean; no unsprayed Harvest.

Spy.—Sprayed, 91 per cent. clean; unsprayed bloomed equally as well but matured no fruit.

Greening.—Sprayed, 92 per cent. clean; unsprayed, 16 per cent. clean.

On Nov. 27th, Mr. Semple writes:—

"If we intend growing apples we will have to spray our trees. I consider the trees that were sprayed had better fruit and fewer fallen apples. The sprayed trees would have 75 per cent. good fruit, and the unsprayed would average about that amount of wormy and imperfect fruit. When the apples were in the barrels you could plainly see the difference. The neighbors noticed I had seven Northern Spy trees, and the one that was sprayed had four barrels of apples, and the unsprayed ones had not a pailful on them. I do not know how to account for the difference. I have just sent you a few facts; you can use them as you see best.

Tavistock, Oxford Co.—Mr. John Mogk's Orchard.

1st application, April 29th.—Fine; buds covered with aphis and some tent-caterpillar; this orchard is in sod and needs pruning and scraping; trees infested with oyster-shell bark louse, cigar case-bearer and apple-leaf bucculatrix.

2nd application, May 12th.—Fine. About one-half of the trees could not be sprayed, as they were in full bloom; in addition to insects previously mentioned bud moth doing some damage.

3rd application, May 26th.—Fine. Blossoms have just fallen.

4th application, June 8th.—Fair. Sprayed trees look well.

5th application, June 22nd.—Fine. A few green apple worms appearing.

6th application, July 6th.—Fine. A few codling moths and a little scab appearing; although the crop is not heavy in this orchard there is a very great contrast between the sprayed and unsprayed trees.

I inspected Mr. Mogk's orchard and found the following results :—

Maiden's Blush.—Sprayed, 85 per cent. clean; unsprayed, 52 per cent. clean.

Ben Davis.—Sprayed, 92 per cent. clean; unsprayed, 25 per cent. clean.

Blenheim Pippin.—Sprayed, 72 per cent. clean; unsprayed, no fruit.

Spy.—Sprayed, 80 per cent. clean, well loaded; unsprayed, no clean fruit.

Talman Sweet.—Sprayed, 88 per cent. clean; unsprayed, 20 per cent. clean. There are 88 trees in this orchard, and the sprayed trees are scattered all through it. Mr. Mogk says there is double as much good fruit on the twelve sprayed trees as on the other 76 trees.

"On Nov. 25th Mr. Mogk writes as follows :—

Out of 88 trees in my orchard 12 were sprayed 6 times at regular intervals and all summer the sprayed trees were easily discernible, even from a distance, by their greater quantity of rich green foliage. The trees sprayed were of the Northern Spy, Blenheim Pippin, Talman's Sweet, Ben Davis, Maiden's Blush, and the Snow apple varieties, and contained more good fruit for the market than all the others taken together, the fruit being cleaner and much less worm-stung. The Snow apple trees had but very few apples, but they had borne very heavily the two years before. All in all I am satisfied, and many others in my neighborhood also who observed the proceedings and effects, that spraying has most beneficial results."

Caledon East, Peel Co.—Mr. Henry Wilson's Orchard.

1st application, May 6th.—Fine. The trees in this orchard are very old and high, stand in sod and are badly infested with tent caterpillar and aphis.

2nd application, May 19th.—Fine after a rain; could only spray four trees, the remainder being in full bloom; in addition to insects previously mentioned canker worm and bud moth at work.

3rd application, June 2nd.—Fine. Sprayed trees look well; tent-caterpillar still bad on unsprayed trees.

4nd application, June 15th.—Rained all day: trees were sprayed when it cleared on the 16th; fruit looking well but scarce.

5th application, June 29th.—Fine. Some green fruit worm and canker worm at work.

6th application, July 13th.—Fine. This is not a first-class orchard, but there is a noticeable difference between the sprayed and unsprayed trees.

I inspected Mr. Wilson's orchard and found the following results;

Snow.—Sprayed, 80 per cent. clean; unsprayed, 91 per cent. clean.

King.—Sprayed, 80 per cent. clean; unsprayed dropped its crop.

Greening—Sprayed, 84 per cent clean; unsprayed, 40 per cent. clean.

Seek-no-Further—Sprayed, 100 per cent. clean; unsprayed dropped its fruit.

Wagner.—Sprayed, 64 per cent clean; no unsprayed fruit.

Mr. Wilson writes :—

"I would say that the trees that were sprayed were very much improved both in leaf and in fruit; so much so that it induced me to buy an outfit for my own use."

Copetown, Wentworth Co.—Mr. A. Hugill's Orchard.

1st application, May 1st—Fine. Buds are beginning to open; tent-caterpillar and aphis at work; oyster-shell bark-louse bad; this is a fairly good orchard but it stands in sod and needs pruning and scraping.

2nd application, May 13th—Rain. Trees in full bloom; did not spray.

3rd application, May 27th—Unsettled. A few bud moth and tent-caterpillar at work, but this orchard is not badly infested with insects.

4th application, June 29th—Fine. A few canker worm here; sprayed trees look well.

5th application, June 23rd—Fine. Some green fruit worm and bud moth seen to-day, also a little scab.

6th application, July 7th—Fine. Sprayed trees free from insects.

7th application, July 22nd—Fine. A very noticeable difference between the sprayed and unsprayed trees.

I inspected Mr. Hugill's orchard and found the following results :—

Baldwin.—Sprayed, 80 per cent. clean; unsprayed, 20 per cent. clean.

King.—Sprayed, 92 per cent. clean; unsprayed, 20 per cent clean, but very little fruit.

Spy.—Sprayed, 84 per cent. clean; unsprayed, 12 per cent. clean.

Greening.—Sprayed, 80 per cent. clean; unsprayed, no fruit.

Harvest.—Sprayed, 80 per cent. clean ; unsprayed, 40 per cent. clean.

Russet.—Sprayed, 92 per cent clean ; unsprayed, 40 per cent. clean.

Esopus Spitzenbergen.—Sprayed, 72 per cent. clean ; no unsprayed fruit.

Mr. Hugill writes :—

"When you were here you took a full report of the sprayed and unsprayed fruit. I think myself the spraying was very satisfactory, as the fruit was much cleaner."

Paris, Brant Co.—Mr. H. McCormick's Orchard.

1st application, April 28th.—Threatening rain ; aphis and tent-caterpillar at work ; orchard in fairly good condition, but needs scraping and pruning ; on account of high wind could only spray from one side of the trees.

2nd application, May 11th—Sprayed immediately after a rain ; bud moth and tent-caterpillar very plentiful, also a few cigar case-bearers.

3rd application, May 25th.—Fine. Could not spray some varieties as they were in full bloom ; but caterpillar are on the unsprayed trees by thousands, while the sprayed trees are clean.

4th application, June 27th.—Sprayed after a heavy shower ; some apples both on sprayed and unsprayed trees are attacked by the green fruit worm.

5th application, June 22nd.—Fine. The sprayed foliage is looking very fine.

6th application, July 5th.—Fine. Sprayed trees clean and healthy.

7th application, July 19th.—Fine. There is not much scab, but codling moth is bad in this orchard.

I inspected Mr. McCormick's orchard and found the following results :—

Ontario.—Sprayed, 100 per cent clean ; unsprayed, 9 per cent. clean ; the sprayed tree has a heavy crop while the unsprayed dropped most of its fruit.

St. Lawrence.—Sprayed, heavy crop about six barrels of first class fruit ; unsprayed, heavy crop, but none fit for use.

Spy.—Sprayed, 88 per cent. clean ; unsprayed 8 per cent. clean ; sprayed Spy well loaded with choice fruit ; unsprayed fruit almost worthless.

Greening.—Sprayed, 80 per cent. clean ; unsprayed 4 per cent. clean.

Talman's Sweet.—Sprayed, 84 per cent. clean ; unsprayed 40 per cent. clean.

Am. Golden Russet.—Sprayed, 60 per cent. clean ; unsprayed 12 per cent. clean ; most of the fruit has fallen from the unsprayed trees.

Baldwin.—Sprayed, 72 per cent. clean ; unsprayed 16 per cent. clean ; very few remaining on the tree.

On Nov. 4th Mr. McCormick writes :—

"Concerning the experimental spraying which was carried on in our orchard this summer I would say that it was a decided success. There were ten different varieties sprayed. The difference was most marked on the Spy, Greening and St. Lawrence. The fruit on the sprayed trees was large and clean, nearly free from worm, and was an average crop. On the unsprayed trees there was almost no fruit free from worms and scab. Throughout the season the foliage of the sprayed trees was abundant, while many of the others were completely stripped by caterpillars and other insects. I would recommend anyone who has an orchard to spray, and to do it thoroughly."

Waterford, Norfolk Co.—Dr. D. Bowlby's Orchard.

1st application, April 27th—Fine. Tent-caterpillar and aphis bad ; orchard in pasture ; trees require pruning and scraping.

2nd application, May 10th.—Fine. Blossoms opening ; caterpillars bad on unsprayed trees ; sprayed foliage looking bad.

3rd application, May 23rd.—Fine.

4th application, June 6th.—Fine. Fruit setting well on most trees ; a few canker worm and green apple worm.

5th application, June 20th —Fine. The difference between the sprayed and unsprayed trees is very noticeable.

6th application, July 4th.—Fine. A few codling moth at work ; a little scab appearing.

I inspected Dr. Bowlby's orchard and found the following results :—

Greening.—Sprayed, 100 per cent. clean ; unsprayed, 44 per cent. clean.

Talman's Sweet.—Sprayed, 68 per cent. clean ; unsprayed, 16 per cent. clean.

King.—Sprayed, 80 per cent. clean ; unsprayed, 24 per cent. clean.

Baldwin.—Sprayed, 84 per cent. clean ; unsprayed, 36 per cent. clean.

Spy.—Sprayed, 88 per cent. clean ; unsprayed, 40 per cent. clean.

Esopus Spitzenberg.—Sprayed, 93 per cent. clean ; unsprayed, 24 per cent. clean. The fruit on the sprayed trees is from one-third to one-half larger than on the unsprayed trees ; the sprayed foliage is also in much better condition than the unsprayed.

Dr. B. says that the early apples which were sprayed gave about the same result as the Spy and Greening.

On Nov. 28th Dr. Bowlby writes :

"The foliage in my orchard for the last few years has not had a healthy look, the leaves blighting and turning yellow. This year on the trees that were sprayed the foliage was a dark green and did not drop off. The fruit showed a marked improvement both in size and having but very few spots."

CLANBRASSIL, HALDIMAND CO.—MR. HUGH MARTIN'S ORCHARD.

1st application, April 26th.—Fine. Trees need pruning and scraping.
2nd application, May 9th.—Fine. Blossoms beginning to open; this orchard is comparatively free from insect enemies.
3rd application, May 22nd.—Fine. Could not spray the Spys and Baldwins as they were in full bloom; a few tent-caterpillars, aphis and bud moth.
4th application, June 5th.—Fine. Green apple worm and canker worm at work.
5th application, June 19th.—Fine. Sprayed trees looking well and fruit setting well.
6th application, July 3rd.—Fine. Some codling moth and a little scab appearing.
7th application, July 18th.—Fine. Both sprayed and unsprayed trees are considerably infested with codling moth.

I inspected Mr. Martin's orchard Sept. 12th and found the following results :—
Spy—Sprayed, 50 per cent. clean ; unsprayed, 12 per cent. clean.
Talman's Sweet.—Sprayed, 70 per cent. clean ; unsprayed, 12 per cent. clean ; not many varieties bearing in this orchard this year ; fruit and foliage in good condition on sprayed trees.

PALMERSTON, WELLINGTON CO.—MR. JOS. RANTON'S ORCHARD.

1st application, April 27th.—Fine. Aphis and bark louse here ; orchard in fairly good condition.
2nd application, May 10th.—Fine, followed by a heavy rain at night. Canker worm, tent-caterpillar and bud-moth at work on unsprayed trees.
3rd application, May 23rd.—Fine. Could not spray as trees were in full bloom.
4th application, June 6th.—Fine. This orchard is in good condition.
5th application, June 20th.—Fine. Green apple worm and apple leaf-roller here.
6th application, July 4th.—Fine, followed by showers in the evening. Codling moth appearing : fruit and foliage clean.
7th application, July 21st.—Fine after the rain. Trees in good condition and well loaded.

I inspected Mr. Ranton's orchard and found the following results ;—
Spy.—Sprayed, 96 per cent. clean ; unsprayed, 12 per cent. clean.
Snow.—Sprayed, 83 per cent. clean, heavy crop; unsprayed, 4 per cent. clean, light crop.
Ben Davis.—Sprayed, 88 per cent. clean ; unsprayed, 52 per cent. clean,
Cayuga Red Streak.—Sprayed, 92 per cent. clean ; unsprayed, 48 per cent. clean.
Astrachan—Sprayed, 75 per cent. clean ; unsprayed, 30 per cent. clean.
Colvert.—Sprayed, 88 per cent. clean ; unsprayed, 44 per cent. clean.
Russet.—Sprayed, 72 per cent. clean ; unsprayed, 76 per cent. clean.
This orchard is thirty or forty years old, stands in a new sod and is in fairly good condition. Mr. Ranton says he never sold over $10 worth of fruit from it in a year before. The crop last year was heavier than this.

Mr. Ranton writes :—
"Concerning the experimental spraying which was carried on in my orchard this summer, I would say the benefit derived from spraying is almost incredible. Last year I had not enough sound fruit for our own use, and this year, owing to the effects of spraying, we have enough for home use and sold forty barrels besides. I have 100 trees in my orchard and there are only 15 sprayed and two-thirds of the fruit was on the sprayed trees. The foliage of the trees showed green and healthy looking beside those not sprayed. As an evidence of my reliance on spraying I bought an outfit and every tree in my orchard will get the benefit next year."

ELMIRA, WATERLOO CO.—MR. DAVID SNIDER'S ORCHARD.

1st application, April 26th.—Fine. Buds just ready to open : trees infested with apple-leaf bucculatrix.
2nd application, May 6th.—Fine. Found oyster-shell bark louse, aphis, bud moth and tent-caterpillar. Orchard in bad shape ; has not been plowed for eighteen years ; needs trimming and scraping ; leaf-roller very bad. The orchard bore heavily last year and will have but a light crop.
3rd application, May 22nd.—Cloudy and windy. Early varieties in full bloom.
4th application, June 5th.—Heavy rain both before and after spraying. Large patches of bark are loosening on the south-west side of many of the trees, more especially of the large ones. This is probably due to the severe frosts of last winter.
5th application, June 19th.—Fine. Green fruit worm doing some damage.
6th application, July 3rd.—Fine, followed by heavy rain at night. Codling moth at work. This orchard is in bad condition and is slowly dying.

I visited Mr. Snider's orchard and found the following results :—
Twenty Ounce Apple—Sprayed, 93 per cent. clean ; unsprayed, 28 per cent. clean.
Spy.—Sprayed, 80 per cent. clean ; unsprayed, 4 per cent. clean.
Spy and Twenty Ounce apple are the only varieties bearing this year.

Under date of Nov. 27th Mr. Snider writes :—
"Many of the trees we sprayed had no apples, but the Northern Spy was loaded and had very few wormy ones. The Twenty Ounce Pippins were the same. Could see no difference in the leaves. I believe it will do good if used at the right time.

Southampton, Bruce Co.—Mr. J. M. McNab's Orchard.

1st application, May 1st.—Fine. Buds on early varieties open, found here green aphis, woolly aphis, cigar case-bearer, bud moth, oyster-shell bark louse; orchard in good condition, well trimmed, but needs scraping.

2nd application, May 13th.—Cloudy, with appearance of rain; blossoms just opening. In addition to insects previously mentioned found canker worm, leaf-roller and tent-caterpillar.

3rd application, May 27th.—Rainy. Could not spray, as trees were in full bloom; wonderful difference between sprayed and unsprayed foliage.

4th application, June 9th.—Fine. Foliage on sprayed trees is perfectly clean, while that on the unsprayed is badly eaten by insects.

5th application, June 23rd.—Fine. Green apple worm doing some damage.

6th application, July 7th.—Rain in the morning, with appearance of more. Fruit clean and large.

7th application, July 19th.—Cloudy, followed by rain. Foliage in good condition; fruit clean and large; a few codling moth appearing.

I inspected Mr. McNab's orchard, and found the following results :—

Baldwin.—Sprayed, 80 per cent. clean; unsprayed, 52 per cent. clean.

Spy.—Sprayed, 80 per cent. clean; unsprayed, no clean fruit.

Greening.—Sprayed, 87 per cent. clean; unsprayed, no clean fruit.

Calvert and Baldwin—Unsprayed, heavily loaded, but no clean fruit.

This orchard stands in sod and is fairly well cared for. There are eighty trees, but Mr. McNab has never sold any apples for packing, and never more than $10 worth in any one year previous to this year.

Mr. McNab writes as follows :—

"The summer of 1899 was the first season my orchard was sprayed. The results were very marked. I would strongly recommend to all parties having orchards the benefits derived from spraying, the apples being much cleaner and finer in appearance, and the foliage remained green longer than previous years. I may also state that for the first time in my experience I sold my apple crop to buyers from a distance, thanks to spraying. Next year I hope to continue the spraying, and anticipate good results."

Mildmay, Bruce Co.—Mr. Jos. Lewis' Orchard.

1st application, April 29th.—Buds well advanced; leaves one-half inch long on some early varieties; found oyster-shell bark louse, cigar case-bearer, green aphis and woolly aphis. This orchard needs pruning and scraping.

2nd application, May 12th.—Fine. Besides insects previously mentioned, find bud moth, canker worm and tent-caterpillar. Sprayed trees very free from insects.

3rd application, May 26th.—Rain ceased at two o'clock; sprayed at three; appearance of more rain. Spys in full bloom.

4th application, June 8th.—Fine. Green fruit worm and leaf-roller at work.

5th application, June 22nd.—Fine. This orchard is not in very good condition.

6th application, July 6th.—Fine. Sprayed fruit and foliage in good condition.

I inspected this orchard and found the following results :—

Spy.—Sprayed, 72 per cent. clean; unsprayed, 10 per cent. clean.

Baldwin.—Sprayed, 84 per cent. clean; unsprayed, 60 per cent. clean.

Talman's Sweet.—Sprayed, 86 per cent. clean; unsprayed, 38 per cent. clean.

On December 2nd Mr. Lewis writes :—

"Concerning the experimental spraying in my orchard this year, I would say that I think it is a great benefit, both to the trees and to the fruit. Throughout the season the foliage on the sprayed trees was a darker green color, was very much less injured by leaf-eating insects, and remained on longer than that of the unsprayed trees. On the unsprayed trees there was almost no fruit free from scab, very few being fit for market, while on the sprayed trees there was about 90 per cent of good fruit."

Listowel, Perth Co.—Mr. Robt. E. Hemphill's Orchard.

1st application, April 28.—Fine, but windy. Buds beginning to open. Found oyster-shell bark louse and apple leaf bucculatrix. Some of the trees are forty feet high; they are poorly pruned and the trunks are whitewashed, but not scraped.

2nd application, May 11th.—Appearance of rain. Leaves about one and one-half inches in diameter canker worm, bud moth and leaf-roller at work.

3rd application, May 25th.—Windy, followed by two days' rain. In addition to insects previously mentioned aphis and tent-caterpillar at work.

4th application, June 7th.—Windy, followed by all night rain. Canker worm doing damage.

5th application, June 21st.—Fine. Green apple worm at work; the trees are looking well considering that they are very old.

6th application, July 5th.—Rain interfered just as we had started spraying. Mr. H. will spray when it clears.

7th application, July 21st.—Fine after raining in the morning; codling moth here in small numbers foliage in good condition; apples large and clean.

I inspected Mr. Hemphill's orchard and found the following results :—

Talman's Sweet.—Sprayed, 92 per cent clean; unsprayed, 32 per cent. clean.

Spy —Sprayed, 92 per cent. clean ; unsprayed, set well but dropped its fruit.

Ribston Pippin.—Sprayed, 80 per cent. clean ; unsprayed, 60 per cent. clean.

Snow.—Sprayed, 93 per cent. clean ; no unsprayed snow trees. For years the snow apples in this orchard have been only fit for cider. There are sixty-six trees in this orchard ; all bloomed about equally, but the unsprayed trees have dropped nearly all their fruit. There will be about one hundred barrels of good fruit this year, three-fourths of which will be from the twenty sprayed trees.

Under date of Nov. 20th Mr. Hemphill writes :—

"I take this way of informing you and all whom this way concern that I am very much pleased that my orchard was chosen as a spraying station this year, as it has given me the largest kind of results. In 1896 the trees were in a most frightful condition. In 1897 I had very little fruit on any one tree that was not full of worms, and the trees were lousy and looked sick. In 1898 I had all kinds of fruit, but could not sell to buyers for shipment : they were too scabby. This fall, after spraying twenty trees out of the sixty-seven, all good big trees, I had as high as eleven barrels of Spys off one tree, and for thirty-one barrels of the best sprayed fruit I received $1.00 per barrel more than was paid for any other apples in this district. The twenty trees sprayed brought me more money three times over than ever the orchard did before. The smallest number of apples gathered from any sprayed tree was four barrels, all good fruit. As to foliage, my trees are holding it yet. The trees that were not sprayed blossomed well, but by June or July the fruit and foliage dropped, so that when the time came for picking there was very little to pick. I picked one barrel off thirty-five unsprayed trees. My trees are very large and strong, but I found it necessary to place large ash poles as props under the sprayed trees. Others were as highly pleased with the results as myself. I cannot praise spraying too highly after this year's work in my own and other orchards."

Tara, Bruce Co.—Mr. W. J. Douglas' Orchard.

1st application, May 2nd.—Fine, leaves on early, varieties one-half inch long; orchard generally in bad shape, needs trimming and scraping; stands in a tough old sod, infested with green aphis, woolly aphis, tent-caterpillar, oyster-shell bark louse, canker worm, bud moth, etc.

2nd application, May 15th.—Cloudy, followed by three days' rain, blossoms already out on early varieties ; there will be very little fruit.

3rd application, May 29th.—Rain both before and after spraying ; tent-caterpillar is very bad, and as the sprayed and unsprayed trees interlace, they pass from one tree to another.

4th application, June 10th.—Fine. The leaves are all stripped from the unsprayed trees in this orchard and insects are crawling on the sprayed trees in large numbers.

5th application, June 24th.—Fine There are very few apples here : the foliage on the sprayed trees is looking remarkably well considering the ordeal through which it passed.

6th application, July 8th.—Could not spray as it rained all day ; arranged to have the trees sprayed on the 10th.

I inspected Mr. Douglas' orchard and found the following results :—

Snow—Sprayed, 93 per cent. clean ; unsprayed, no clean fruit.

King—Sprayed, 93 per cent. clean ; no unsprayed trees.

Spy—Sprayed, 91 per cent. clean ; unsprayed, 4 per cent. clean.

There are 120 trees in this orchard from 20 to 35 years old. Apart from the sprayed trees there will not be one barrel of good fruit in the orchard.

Mr. Douglas writes—

"With regard to the orchard, it happened to be an exceedingly poor year for fruit, as I only had some seven or eight barrels altogether, but were nearly all clean fruit, owing to spraying. The foliage on the sprayed trees was very deep in color and healthy compared with those unsprayed. One snow-apple tree in particular had borne no fruit of any account for years, and then only fit for pig feed, on account of the scab ; but this year, thanks to spraying, there was a good crop on the tree, an increase in size and perfectly clean. My trees were very bad with the oyster-shell bark louse. I am convinced that we cannot under any consideration do without spraying."

Wiarton, Bruce Co.—Mr. John Dance's Orchard.

1st application, May 4th.—Fine but windy. Buds open on early varieties ; green and woolly aphis, tent-caterpillar, bud moth and oyster-shell bark louse in this orchard.

2nd application, May 17th.—Could not spray on account of rain : blossoms just ready to open ; orchard needs pruning and scraping.

3rd application, May 31st.—Rained till two o'clock ; sprayed at three ; late varieties in full bloom ; tent-caterpillar very bad on unsprayed trees.

4th application, June 13th.—High wind followed by heavy rain at night.

5th application, June 27th.—Warm, followed by rain at night.

6th application, July 11th.—Fine. Some codling moth appearing : in spite of the unfavorable weather the trees are in good condition and the fruit large and clean.

On inspecting Mr. Dance's orchard I found the following results.

Snow—Sprayed, 92 per cent. clean.

California Russet—Sprayed, 92 per cent. clean ; unsprayed, 8 per cent. clean.

St. Lawrence—Sprayed, 92 per cent clean ; unsprayed, no clean fruit.
Spy—Sprayed, 64 per cent. clean ; unsprayed, heavily loaded but not a clean apple.
Greening—Sprayed, 88 per cent. clean ; unsprayed, not a clean apple.
King—Sprayed, 68 per cent. clean ; unsprayed, equal bloom but dropped its fruit.
Astrachan—Sprayed, 70 per cent. clean ; unsprayed, 50 per cent. clean.
Strawberry Pippin—Sprayed, 88 per cent. clean ; unsprayed, 36 per cent. clean.
Talman's Sweet—Sprayed, 84 per cent. clean ; unsprayed, 20 per cent.
Unknown apple—Sprayed, 96 per cent. clean ; unsprayed, no clean fruit.
Crab-apple—Sprayed, heavy crop of good fruit, first in years.
Flemish Beauty Pear—Sprayed, 92 per cent. clean ; unsprayed, no clean fruit. These trees stand 15 feet apart and are both heavily loaded.

Mr. Dance says there are 100 trees in his orchard 25 years old, and that nine-tenths of the marketable fruit is on the 17 sprayed trees.

Under date of November 25th, Mr. Dance writes—

"The experimental spraying has proved very satisfactory. The California Russet that was sprayed was well loaded with good fruit, and the fruit on the unsprayed tree was not worth gathering. Out of ten Spys, two were sprayed and had more good fruit on them than the eight that were not sprayed. Out of six Snow trees, sprayed one, and it had more good fruit on it than the other five that were not sprayed. Other kinds about the same. There was very little good fruit except on the trees that were sprayed. Of two Flemish Beauty pear trees sprayed one was heavily loaded with very fine fruit ; on the unsprayed tree the fruit was spotted and cracked. All of the trees that were sprayed made a good growth and look healthy, and keep their leaves much longer than those that were not sprayed. Many who went through the orchard were surprised to see the difference between the sprayed and unsprayed trees. A few years ago we had very fine fruit, but last year I was afraid the orchard would soon be of little value to us. I hope, with proper spraying at the right time, we may again have good fruit and healthy trees."

Chesley, Bruce Co.—Mr. D. M. Halliday's Orchard.

1st application, May 3rd.—Fine. Leaves about three-fourths of an inch long ; trees are literally covered with tent-caterpillar and bud moth, also some aphis and oyster-shell-bark louse ; orchard in fair condition, but foliage already badly eaten by worms ; could not spray both sides thoroughly on account of the very high wind.

2nd application, May 16th.—Could not spray on account of rain.

3rd application, May 30th.—Fine but very windy ; bloom all fallen ; this is only the second spraying, as the trees were in full bloom when the weather cleared up after the second trip.

4th application, June 12th.—Prospect of rain to-night ; canker worm and green fruit worm at work ; sprayed trees healthy and showing well for a crop.

5th application, June 26th.—Fine. Scab appearing on Snow App'es.

6th application, July 10th.—Fine. Sprayed trees in good condition ; apples clean and large. Mr. Halliday sprayed all his orchard except checked trees.

I inspected Mr. Halliday's orchard and found the following results :—

Spy—Sprayed, 92 per cent. clean ; unsprayed, 4 per cent. clean.
Ben Davis—Sprayed, 96 per cent. clean ; unsprayed, 50 per cent. clean.
Snow—Sprayed, 92 per cent. clean ; no unsprayed Snows in this orchard, but in a neighbor's orchard along side they were almost worthless.

On November 23rd Mr. Halliday writes—

"I consider the spraying of the fruit trees in my orchard this season a great benefit. On the trees sprayed, fully 95 per cent. of the fruit was found to be clean and sound, free from worms and scabs, while on the unsprayed not more than 20 per cent. were good. The benefit was most noticeable on the Spys and Snows. The foilage on all the sprayed trees remained green and healthy to the end of the season. I would fully recommend all who wish to get good, clean, marketable fruit from their orchards, to spray the trees four or five times during the season."

Markdale, Grey Co.—Mr. Thos. Mercer's Orchard.

1st application, May 5th.—Fine after a rain ; leaves about one-half inch long ; orchard in bad condition ; infested with oyster-shell bark louse, green and woolly aphis, bud moth, tent-caterpillar, Tussock moth, etc.

2nd application, May 18th.—Could not spray on account of rain ; blossoms nearly out ; sprayed trees clean, others badly eaten. Mr. M. will apply the mixture when the weather permits.

3rd application, June 1st.—Fine. The second application was not made as arranged as the pump would not work. Persons visit this orchard nearly every day to see the results.

4th application, June 14th.—Spraying followed by heavy rain ; considerable improvement has been made in the general appearance of this orchard.

5th application, June 28th.—Could not spray on account of rain ; green fruit worm and codling moth at work. Mr. M. will spray when it clears.

6th application July 12th.—Fine, apple crop light, the foliage having been destroyed by insects last year.

I inspected Mr. Mercer's orchard and found the following results :—
Snow—Sprayed, 89 per cent. clean ; unsprayed, 16 per cent clean.
St. Lawrence—Sprayed, 96 per cent. clean ; unsprayed, no clean fruit.
Russet—Sprayed, 90 per cent. clean ; no unsprayed trees.
Talman's Sweet—Sprayed, 93 per cent. clean ; unsprayed, 28 per cent. clean.
Canada Red—Sprayed, 88 per cent. clean ; unsprayed dropped its crop.
On Nov. 27th Mr. Mercer writes :—

"I consider the spraying of fruit trees a great benefit. My orchard is nearly all old trees and did not bear very well. The leaves were very small before spraying, and after they were sprayed they were of a dark green, healthy color. The last few years the fruit has been small and scabby, and this year the apples are entirely free from scab and are large and healthy looking, especially the St. Lawrence, Snow and Talman's Sweet. I would recommend anyone who has an orchard and wants to grow good fruit to spray the trees four or five times during the season. "I intend spraying next season, as I am well pleased with the results of this year's spraying."

Shelburne, Dufferin County.—Mr. M. Harrison's Orchard.

1st application, May 6th.—Cloudy ; leaves well advanced some being one-half inch in diameter ; orchard in good condition, well trimmed and scraped ; found oyster-shell bark louse, aphis, bud moth and tent-caterpillar.
2nd application, May 19th.—Cold and foggy ; blossoms nearly out ; a small orchard but very well kept.
3rd application, June 2nd.—Fine ; this orchard is clean while across the road is an orchard stripped of foliage.
4th application, June 15th.—Fine.
5th application, June 29th.—Fine ; some codling moth and apple worm at work ; apples large and clean.
6th application, July 13th.—Fine ; sprayed trees are in good condition and some heavily loaded.

I inspected Mr. Harrison's orchard and found the following results :—
Talman's Sweet—Sprayed 91 per cent. clean ; unsprayed dropped its fruit.
Snow—Sprayed 96 per cent. clean ; unsprayed 24 per cent. clean.
Harvest—Sprayed 90 per cent. clean ; unsprayed 5 per cent. clean.

Keene, Peterborough Co.—Mr. Jas. Elmhirst's Orchard.

1st application, May 1st.—Showery : had to apply the mixture while the trees were still wet ; tent-caterpillar already very bad ; oyster-shell bark louse bad ; trees need pruning and scraping.
2nd application, May 15th —Heavy rain until 2 p. m. ; applied the mixture in a heavy gale.
3rd application, May 27th.—Could not spray on account of rain ; Mr. Elmhirst made the application on the 29th, but it was immediately followed by rain.
4th application, June 10th.—Fine ; bud moth and green fruit worm at work.
5th application, June 24th.—Fine ; fruit and foliage clean.
6th application, July 8th.—Cloudy, followed by rain at night ; a little scab showing ; codling moth doing slight damage Mr. Elmhirst sprayed the remainder of his orchard after each application given the experimental trees. The result was that the whole orchard was kept clean of caterpillars, with the exception of those trees marked not to be sprayed, some of which were badly infested. Surrounding orchards were eaten up with them. Mr. Elmhirst said his orchard was alive with them last year.

I inspected this orchard and found the following results :
Harvest—Sprayed, 90 per cent, clean ; no unsprayed fruit.
Snow—Sprayed, 92 per cent. clean ; no unsprayed Snows.
Bellefleur—Sprayed, 92 per cent. clean ; unsprayed, 60 per cent. clean.
Ben Davis—Sprayed, 96 per cent clean ; no unsprayed trees.
Haas—Sprayed, 96 per cent. clean ; unsprayed, 36 per cent. clean ; dropped most of its fruit.
There was no fruit on either the sprayed or unsprayed Colverts and Spys.
Alexander—Sprayed, 88 per cent. clean ; no unsprayed trees.
The woods and unsprayed orchards in this section were stripped of their foliage both last year and this year.
On Nov. 23rd, Mr. Elmhirst writes as follows :

"I think spraying a great benefit. The fruit was free from scab and worm. I also found a great improvement in the foliage, as well as the fruit. The foliage stayed on much longer this year than other years, and looked better. I could not expect much this year, as it rained every time we sprayed but the last twice. The trees were badly eaten by the caterpillar last year, and I think spraying a great help to destroy them as well as other insects. The results of spraying were very satisfactory, and intend spraying another year."

Havelock, Peterboro' Co—Mr. Robt. Johnston's Orchard.

1st application, April 29th.—Fine. Buds just bursting. Tent-caterpillar very bad here.
2nd application, May 12th.—Warm, followed by heavy rain. Trees alive with tent-caterpillar ; a few bud moth at work ; used six ounces of Paris green ; Duchess and Snow could not be sprayed as they were in full bloom.

3rd application, May 26th.—Heavy rain ; could not spray ; Mr. Johnston did the work on the 29th. Sprayed trees are free from tent-caterpillar while unsprayed ones are alive with them.

4th application, June 9th.—Fine. Bud moth, canker worm, green fruit worm and tent-caterpillar at work.

5th application, June 23rd.—Fine. Fruit and foliage clean and healthy.

6th application, July 7th.—Fine. Scab showing a little on Snows.

7th application, July 26th—Fine. A few codling moths working. I inspected Mr. Johnston's orchard and found the following results :—

Snow.—Sprayed, 96 per cent. clean ; unsprayed, 81 per cent. clean.

Talman's Sweet.—Sprayed, 92 per cent. clean ; unsprayed, 50 per cent. clean.

Spy.—Sprayed, 96 per cent. clean ; unsprayed, dropped their fruit.

Greening.—Sprayed, 90 per cent. clean ; unsprayed, no fruit.

Demorestville, Prince Edward Co.—Mr. John Crawford's Orchard.

1st application, May 5th.—Appearance of rain. Blossoms showing color ; first spraying should have been done about two weeks earlier. Bud moth and tent-caterpillar very bad : found also canker worm, green fruit worm, cigar and pistol case-bearers and aphis at work. The people were astonished when shown so many insects which they had never noticed before.

2nd application, May 18th.—Unsettled. Could not spray as trees were in full bloom.

3rd application, June 1st.—Fine. Foliage clean and healthy, but not so free from insects as it would have been had not the last spraying been omitted.

4th application, June 15th.—Fine. Could only spray thoroughly from one side on account of a high wind.

5th application, June 29th.—Fine. Foliage clean and healthy.

6th application, July 13th.—Fine. Codling moth at work.

On visiting Mr. Crawford's orchard I found the following results :—

Bellefleur.—Sprayed, 80 per cent. clean ; unsprayed, 28 per cent. clean.

All the other apples in this orchard were packed when I arrived, but Mr. Crawford says they are the most perfect fruit that he ever had from his orchard. He says that the Kings and Wagners would show as good a percentage as the Bellefleurs. The foliage on the sprayed trees is still (October 16th) in first class condition.

On Nov. 24th, Mr. Crawford writes as follows :—

"Regarding the experimental spraying done in my orchard this summer, I would say it certainly was a benefit. I have always taken the best care of my orchards, but the benefit of spraying is very evident. The foliage was very abundant and well formed. The apples were a splendid sample, showing hardly any spots and very few worms in them. I was so well satisfied with the results that I bought an outfit and expect to carry on systematic spraying in all my orchards next season, anticipating the very best results."

Milford, Prince Edward Co.—Mr. Andrew Head's Orchard.

1st application, May 4th.—Fine. Orchard well cultivated and fairly well pruned ; leaves about an inch long and already badly eaten by insects ; tent-caterpillar and bud moth very bad ; aphis plentiful ; a few cigar and pistol case-bearers and canker worms. The trees seem to be alive with insects. The first spraying should have been done earlier.

2nd application, May 17th.—Cloudy, followed by rain ; insects have been checked by the spraying.

3rd application, May 31st.—Shower just after the work was finished ; canker worms bad on unsprayed trees.

4th application, June 14th.—Fine. Many unsprayed trees have been defoliated by canker worms.

5th application, June 28th.—Could not work as it rained all day.

6th application, July 12th.—Fine. Some codling moth at work ; sprayed, foliage in good condition.

I inspected this orchard and found the following results :—

Snow.—Sprayed, 90 per cent. clean ; unsprayed, showed equal bloom, 5 per cent. clean, remainder worthless.

Greening.—Sprayed, 95 per cent. clean ; unsprayed, 40 per cent. clean.

Head's Favorite.—Sprayed, 90 per cent. clean ; unsprayed, 40 per cent. clean.

Ben Davis.—Sprayed, 75 per cent. clean ; unsprayed, 33 per cent. clean.

Russet.—Sprayed, 80 per cent. clean, heavy crop ; unsprayed, light crop, no clean fruit.

Wealthy.—Sprayed, 70 per cent. clean ; unsprayed, no clean fruit, dropped most of its crop.

Spy.—Sprayed, 95 per cent. clean ; unsprayed, good bloom but no fruit.

Crab.—Sprayed, good crop of clean fruit ; unsprayed, heavy load but no clean specimens.

Four pear trees standing side by side were taken, two were sprayed and two unsprayed ; the sprayed trees were heavily loaded with good fruit while that on the unsprayed ones was worthless.

Mr. Head writes as follows concerning the spraying in his orchard :—

"With regard to the experimental spraying done in my orchard this season I think it a great benefit. The fruit was clean and free from scab, while that which was not sprayed was small inferior fruit and very much infested. The sprayed foliage was healthy and free from injury by insects, while the unsprayed ones were nearly stripped of their foliage by them. I am confident people will have to spray their fruit trees in this district or there will be little use of trying to raise fruit.

Wellington, Prince Edward County —Mr. D. Gillander's Orchard.

1st application, May 3rd.—Fine ; strong wind. Tent-caterpillar, bud moth and aphis at work. This orchard is in the worst condition of any in this division. It has received poor cultivation and very little attention : needs pruning and scraping, and is badly infested with oyster-shell bark louse.

2nd application, May 16th.—Rained both before and after spraying ; blossom buds just showing color.

3rd application, May 30th.—Fine. Could not spray as trees were in full bloom.

4th application, June 13th —Fine Green fruit worm is doing some damage.

5th application, June 27th.—Fine, followed by heavy rain on 28th ; foliage in good condition.

6th application, July 11th.—Fine. Fruit and foliage clean ; very little codling moth.

In Mr. Gillander's orchard I found the following results :—

Talman's Sweet—Sprayed, 96 per cent clean ; unsprayed, 76 per cent. clean.

Spy.—Sprayed. 92 per cent. clean ; unsprayed, 15 per cent. clean.

Holland Pippin—Sprayed, 90 per cent. clean; unsprayed, 15 per cent. clean.

Baldwin—Sprayed, 100 per cent. clean ; no unsprayed trees.

The dealer who bought the orchard said that the apples were the cleanest he had found this year.

Colborne, Northumberland Co.—Mr. N. D. Snetsinger's Orchard.

1st application, May 2nd —Fine, but windy. Leaves about the size of rose leaves and already badly eaten by insects which are very numerous in this orchard. Found tent-caterpillar, cigar and pistol case-bearers, bud moth, aphis and oyster-shell bark louse.

2nd application, May 15th.—Fine, followed by rain on the 16th. Trees about ready to break into bloom; insects still at work; can already see a difference between sprayed and unsprayed trees.

3rd application, May 29th.—Cloudy, followed by a heavy rain. Trees are in full bloom ; did not spray.

4th application, June 12th.—Cloudy. In addition to insects previously mentioned, green fruit worm and canker worm are at work.

5th application, June 26th.—Fine. Sprayed, trees clean.

6th application, July 10th.—Fine. Codling moth doing some damage. Case-bearers have been very bad in this orchard and have damaged both sprayed and unsprayed trees.

I examined Mr. Snetsinger's orchard and found the following results :—

Bellefleur.—Sprayed, 87 per cent. clean ; no unsprayed fruit.

Spy.—Sprayed, 80 per cent. clean; unsprayed, no fruit.

Russet.—Sprayed, 60 per cent. clean ; unsprayed, no clean fruit.

Snow.—Sprayed, 80 per cent. clean ; unsprayed, 36 per cent. clean.

Wagner.—Sprayed, 84 per cent. clean ; unsprayed, 8 per cent. clean.

Greening.—Sprayed did not bear ; unsprayed, 52 per cent. clean.

Baldwin.—Neither the sprayed nor the unsprayed trees fruited.

Mr. Snetsinger writes as follows concerning the spraying in his orchard :—

"*Re* the spraying in my orchard in 1899, would say the spraying has been a success. The trees that were sprayed had fully 75 per cent. of good fruit, and would have had more if the third application had not been missed on account of the trees being in full bloom. Of my apples last year 75 per cent. dropped off the trees after they were half grown. I thought it was on account of the dry weather, but this year was drier than last and not 10 per cent. of the apples dropped from the trees. If I had not sprayed I would not have had any apples at all, as my orchard was infested with all kinds of destructive insects. By spraying the foliage of the orchard was kept fine, and I expect to reap more benefit next year from the spraying done this year. Next spring I intend to commence spraying early, and continue until the apples are past all danger."

Markham, York Co.—Mr. A. H. Crosby's Orchard.

1st application, April 26th —Fine ; buds just bursting ; tent caterpillar at work; oyster-shell bark louse very bad, some limbs being completely covered. The trees are in sod, badly affected with apple tree canker, and need scraping and pruning badly.

2nd application, May 9th,—Fine ; bud-moth and tent-caterpillar at work. The latter are doing terrible damage in some orchards in this neighborhood.

3rd application. May 22nd—Showery. Could not spray as the trees were in bloom.

4th application, June 6th —Fine. Foliage on unsprayed trees badly eaten ; sprayed trees clean. On account of high wind trees could only be sprayed from one side. Scab appearing badly on unsprayed fruit and foliage.

6th application, July 4th.—Fine. Sprayed foliage mostly clean.

7th application, July 21st.—Fine. Sprayed trees in good shape ; very little codling moth.

I inspected Mr. Crosby's orchard and found the following results :—

Spy.—Sprayed, 72 per cent. clean; unsprayed dropped fruit and foliage is in bad condition.

Harvest.—Sprayed, 95 per cent. clean ; unsprayed, no fruit.

Baldwin.—Sprayed, 88 per cent. clean ; unsprayed dropped the crop.

Snow.—Sprayed, 90 per cent. clean ; unsprayed, 30 per cent. clean, light crop.

Holland Pippin.—Sprayed, 80 per cent. clean.

Under date of Nov. 22nd, Mr. Crosby writes as follows :—

"The spraying in my orchard was a success this year in regard to foliage and fruit. There

was a marked difference in the foliage. You could easily tell the difference forty rod away on the Spy trees. The difference between sprayed and unsprayed Baldwins at the time of picking was very great. There were only a few apples left on the unsprayed trees. The Holland Pippins were entirely free from scab, the finest we have had for years. The sprayed Snows were free from scab; of the unsprayed very few remained on the trees. The Early Harvest were really fine. It was something new for us to have Harvest apples that were fit for use. I am convinced that spraying will prevent scab and kill all tent-caterpillars. I intend to spray thoroughly next year."

Beamsville, Lincoln Co.—Mr. I. G. Houser's Orchard.

1st application, April 25th.—Fine and warm; buds just bursting; oyster-shell bark louse; apple-leaf bucculatrix, and larvæ of codling moth in cocoons on this orchard; tent-caterpillar already at work; trees are well trimmed and scraped, but there is some apple tree canker here.

2nd application, May 8th.—Cool and cloudy; this orchard will soon be in bloom; tent-caterpillar and bud-moth at work.

3rd application, May 20th.—Cool and cloudy; could not spray as trees were in bloom; no insects working on sprayed foliage.

4th application, June 5th.—Fine and hot; sprayed foliage clean and healthy.

5th application, June 19th.—Fine.

6th application, July 3rd.—Fine and windy; very little codling moth yet.

7th application, July 17th.—Rain, could not spray.

I inspected Mr. Houser's orchard and found the following results:—

Spy—Sprayed, 84 per cent. clean; unsprayed, 10 per cent. clean.

Greening—Sprayed, 60 per cent. clean; unsprayed, 24 per cent. clean.

Fall Pippins—Sprayed, 70 per cent. clean; unsprayed, dropped fruit.

This orchard has not done well this year. It stands in sod and bore heavily last year. This with the severe drouth of last summer probably accounts for the failure.

Mr. Houser writes as follows:—

"The apples, either sprayed or unsprayed, were of an inferior quality; I had very few good apples, none to sell. However, I do not condemn the practice of spraying, I know it produces good effects on other fruits, and even on the apple trees sprayed by you this year there was quite a good percentage, more of apples free from worms than upon those not sprayed. I can testify, however, that spraying kills the caterpillar all right."

Omemee, Victoria Co.—Mr. Jos. Sandy's Orchard.

1st application, April 28th.—Fine. Buds just bursting. Tent-caterpillar at work. Orchard in sod. Trees injured by oyster-shell bark louse, apple tree canker and borers.

2nd application, May 11th.—Fine after the rain. The caterpillars are something terrible in this orchard, and are much worse on the unsprayed trees than on the sprayed. Used six ounces of paris green to the barrel.

3rd application, May 25th.—Rain after the work was completed. A few caterpillars still on the sprayed trees; the unsprayed trees are alive with them. Baldwin, Spy, Ben Davis and Russet were not sprayed, as they were in full bloom.

4th application, June 8th.—Fine. Sprayed foliage clean and healthy; unsprayed badly eaten by tent-caterpillar.

5th application, June 22nd.—Rained in the morning.

6th application, July 6th.—Fine. Most varieties well loaded. While many unsprayed trees were almost stripped of foliage by the tent-caterpillar, the sprayed trees have suffered no noticeable damage.

7th application, July 24th.—Fine. While all the fruit here looks clean, the sprayed fruit is especially so.

I inspected Mr. Sandy's orchard and found the following results.

Ben Davis—Sprayed, 96 per cent. clean; unsprayed, 70 per cent. clean.

Snow—Sprayed, 90 per cent. clean; unsprayed, no fruit.

Harvest—Sprayed, 85 per cent clean; unsprayed, 30 per cent. clean.

Colvert—Sprayed, 90 per cent. clean; unsprayed, fruit dropped.

Spy—Sprayed, no fruit; unsprayed, bore about one peck of inferior fruit. Spy trees used in experimental work unfortunately had no fruit. Mr. Sandy sprayed all the Spys except the check trees and they are well loaded with good fruit.

On Dec. 1st Mr. Sandy writes as follows:—

"It is our opinion that spraying is a great benefit to fruit growers. This year, however, we can see the contrast more in the foliage than in the fruit, as the fruit crop is small in this section, and the apple scab not very bad. However, we believe it just as reasonable to expect good results from spraying fruit trees as from Paris greening potatoes."

Prince Albert, Ontario Co.—Mr. W. F. Weir's Orchard.

1st application, April 27th.—Fine. Buds just bursting. Oayster-shell bark louse plentiful here.

2nd application, May 10th.—Fine, followed by rain on the 11th. Bud moth and tent-caterpillar quite plentiful; also a few green fruit worms.

3rd application, May 23rd.—Fine. Could not spray as trees are in full bloom.

4th application, June 27th.—Appearance of rain. The foliage of the sprayed trees is clean; of the unsprayed much eaten.
5th application, June 21st.—Fine.
6th application, July 5th.—Fine. Sprayed fruit and foliage clean and healthy.
7th application, July 22nd.—Fine. Very little codling moth here.

Inspected Mr. Weir's orchard and found the following results.
Talman's Sweet—Sprayed, 100 per cent. clean; unsprayed, 76 per cent. clean.
Snow—Sprayed, 90 per cent. clean; unsprayed, 60 per cent. clean.
Unknown Variety—Sprayed, 92 per cent. clean; unsprayed, 40 per cent. clean.
Greening—Sprayed, 95 per cent. clean; unsprayed, no bloom.
Russet—Sprayed, 88 per cent. clean; unsprayed, 72 per cent. clean.
Ben Davis—Sprayed, 100 per cent. clean; unsprayed, 50 per cent. clean.
Spy—Sprayed, 92 per cent. clean; unsprayed, no fruit.
Colvert—Sprayed, 100 per cent. clean; unsprayed, 50 per cent. clean.

THIRTIETH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY

OF

ONTARIO.

1899.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS, ETC., 68 AND 70 FRONT STREET WEST.
1900.

CONTENTS

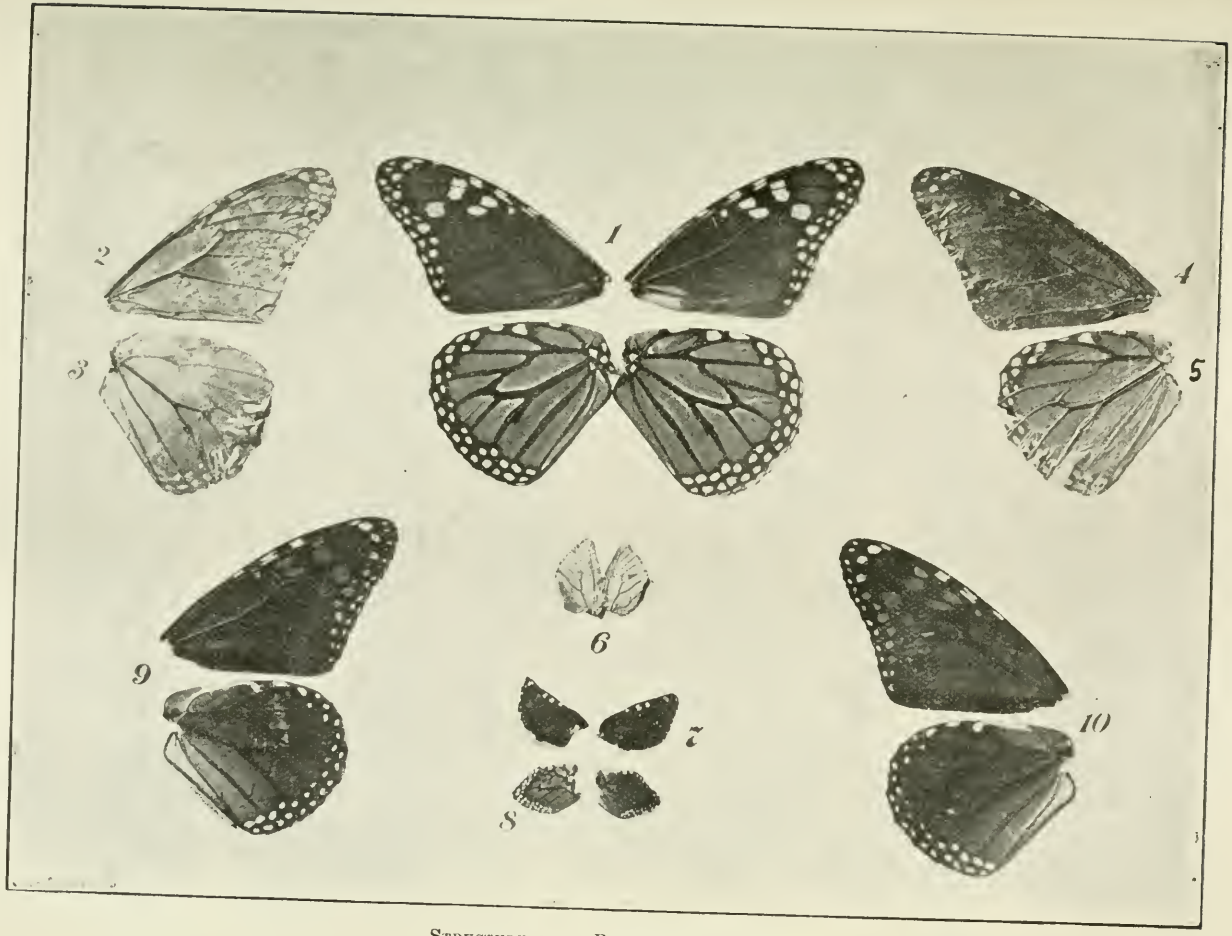
LETTER OF TRANSMISSION 1
Officers for 1899-1900 2

ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO 3
Conference on the San Jose Scale 3

THE PRESIDENT'S ANNUAL ADDRESS: HENRY H. LYMAN 21
Some Interesting Insects: JAMES FLETCHER 30
One Hundred Years of American Entomology: F. M. WEBSTER 32
Some Common Insects of the Orchard, Garden and Farm: W. LOCHHEAD 41
Report of the Council 42
Report of the Librarian and Curator 44
Report of the Treasurer and Auditors 44
Report of the Geological Section 45
Report of the Microscopical Section 47
Report of the Montreal Branch 48
Report of the Toronto Branch 49
Report of the Quebec Branch 51
Report to the Royal Society of Canada 52
The Native Home of the San Jose Scale: F. M. WEBSTER 55
Some Notes on the Larval Habits of the Gray Hair-streak Butterfly: F. M. WEBSTER 56
San Jose Scale 57
Notes on Some Insects on Coniferous Shade-trees: W. LOCHHEAD 60
The Electric Light as an Attraction to Moths: ARTHUR GIBSON 64
Injurious Insects of the Orchard, Garden and Farm in 1899: W. LOCHHEAD 66
Asparagus Beetles: W. N. HUTT 71
Fatal Bite of an Insect: C. J. S. BETHUNE 73
Remarks Upon Some Cuban Insects: J. ALSTON MOFFAT 75
The Wing-structure of a Butterfly: J. ALSTON MOFFAT 78
Nature-study Lessons on the Cabbage Butterfly: W. LOCHHEAD 82
Spiders: T. W. FYLES 88
Notes on Insects of the Year—Division No. 1: W. H. HARRINGTON 94
" " Division No. 2: J. D. EVANS 96
" " Division No. 3: ARTHUR GIBSON 97
Notes of the Season of 1899: J. ALSTON MOFFAT 98
" " C. J. S. BETHUNE 100
" " T. W. FYLES 102
Injurious Insects in Ontario During 1899: JAMES FLETCHER 106
Some Observations of a Bumble-bees' Nest: C. J. S. BETHUNE 111

THE NORTH-WEST (CANADA) ENTOMOLOGICAL SOCIETY, ANNUAL MEETING 112
Report of the Council 113
Address by the President: PERCY B. GREGSON 114
The Use of Entomology: C. J. S. BETHUNE 118
The Pocket Gopher: HENRY GEORGE 120
Address: HENRY H. LYMAN 121
Henry Herbert Lyman 123
Book Notices—Obituary 124
Index 125

Henry Herbert Lyman, M.A.,
President of the Entomological Society of Ontario, 1897-1898.



Structure of a Butterfly's Wing.

THIRTIETH ANNUAL REPORT

OF THE

ENTOMOLOGICAL SOCIETY OF ONTARIO

1899.

To the Honorable John Dryden, Minister of Agriculture:

SIR,—I have the honor to present herewith the thirtieth annual report of the Entomological Society of Ontario.

The thirty-sixth annual meeting of the Society was held in the City of London on the 11th and 12th of October, 1899, when the officers for the ensuing year were elected and the necessary business of the Society was transacted. The report contains a full account of an important conference upon the San Jose Scale, to which the first afternoon was devoted, the audited statement of the Treasurer, reports of the various branches, sections and officers of the Society, and of the papers and addresses presented during the meeting.

The Society's monthly magazine, the *Canadian Entomologist*, has been regularly issued and has just completed its thirty-first volume. It continues to maintain its high reputation as a valuable scientific publication and to attract the contributions of the most eminent Entomologists of the day, both here and in other countries.

I have the honor to be, Sir,

Your obedient servant,

CHARLES J. S. BETHUNE,

LONDON, Ontario. Editor.

OFFICERS FOR 1899-1900.

President.—Rev T. W. Fyles, D.C.L., F.L.S. ..... South Quebec.

Vice-President.—Professor Wm. Lochhead, Ontario Agricu tural College..... Guelph.

Secretary.—William E. Saunders..... London.

Treasurer.—J. A. Balkwill..... London.

Directors :

Division No. 1.—W. H. Harrington, F.R.S.C ..... Ottawa.
" 2.—J. D. Evans..... Trenton.
" 3.—D. G. Cox..... Toronto.
" 4.—James Johnson ..... Bartonville.
" 5.—R. W. Rennie..... London.

Directors ex officio (ex-Presidents of the Society) :

Professor Wm. Saunders, LL.D, F.R.S.C, F.L.S., Director of the Experimental Farms..... Ottawa.
Rev. C. J. S. Bethune, M.A., D.C.L, F.R S.C..... London.
James Fletcher, LL.D., F.R.S.C., F.L.S., Entomologist and Botanist, Experimental Farms ..... Ottawa.
John Dearness, I.P.S ..... London.
Henry H. Lyman, M.A. ..... Montreal.

Director ex-officio (Ontario Agricultural College).—Professor Wm. Lochhead..Guelph.

Librarian and Curator.—J. Alston Moffat..... London.

Auditors.—J. H. Bowman and W. H. Hamilton ..... London.

Editor of the Canadian Entomologist.—Rev. Dr. Bethune ..... London.

Editing Committee.—Dr. J. Fletcher, Ottawa ; H H. Lyman, Montreal ; J. D. Evans, Trenton ; W. H. Harrington, Ottawa ; Prof Lochhead..... Guelph.

Delegate to the Royal Society.—Rev. Dr. Bethune ..... London.

Delegates to the Western Fair.—J. Dearness and Dr. Bethune ..... London.

Committee on Field Days.—Dr. Woolverton, Messrs. Balkwill, Bowman, Elliott, Law, Percival, Rennie and Saunders ..... London.

Library and Rooms Committee.—Messrs. Balkwill, Bethune, Dearness, Moffat and Saunders ..... London.

THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

ANNUAL MEETING.

The thirty-sixth annual meeting of the Entomological Society of Ontario was held in the rooms of the Society, Wellington Street, London, on Wednesday and Thursday, October 11th and 12th. The Council met on Wednesday at 11 a.m. for the purpose of preparing its annual report and transacting the ordinary business of the Society. At the request of the President, Mr. Henry H. Lyman, of Montreal, the chair was occupied by the Rev. Dr. Bethune, of London The following additional members were also present: Rev. Dr. Fyles, South Quebec; Dr. James Fletcher, Entomologist and Botanist, and Mr. Arthur Gibson Assistant Entomologist, Experimental Farms, Ottawa; Professor Lochhead, Ontario Agricultural College, Guelph; Messrs. W. E. Saunders, J. A. Balkwill, R. W. Rennie and J. Alston Moffat, London. Letters expressing regret at their inability to attend the meeting were received from Mr. W. H. Harrington, Ottawa; Mr. J. D. Evans, Trenton; Mr. G. M. Stewart, Secretary of the Toronto Branch; and Mr. Dwight Brainerd, Montreal.

The President brought up the subject of members' subscriptions that are in arrears and gave a tabulated statement of those in this position. After some discussion a by-law was adopted in which instructions are given to the Secretary for dealing with all such cases, and if necessary, discontinuing the sending of the Magazine and Report.

Dr. Bethune drew the attention of the Council to the fact that the membership of the Society had so largely increased during the last few years that the number of surplus copies of the *Canadian Entomologist* had become alarmingly small. He presented a tender from the London Printing and Lithographing Company, and it was decided to increase the monthly issue by one hundred copies, beginning with the number for January, 1900.

The report of the Council was then prepared, and after the transaction of some further details of business, the meeting adjourned.

Conference on the San Jose Scale.

The Society met at 3 o'clock on Wednesday afternoon, October 11th, for the purpose of holding a conference on the all-important subject of San Jose Scale. The following members were present, in addition to those already mentioned: Prof. C. C. James, Deputy Minister of Agriculture for Ontario, Toronto; Inspector G. E. Fisher, Freeman, Ont.; Prof. F. M. Webster, Wooster, Ohio; Messrs. J. Dearness, H. Gould, J. Law, J. S. Pearce, W. Percival, H. S. Saunders, Spencer, Dr. W. J. Stevenson and others. The chair was taken by the President, Mr. Henry H. Lyman, Montreal.

The Chairman: I have much pleasure in welcoming you to this 36th annual meeting of the Entomological Society of Ontario. We are particularly fortunate this year in having a number of distinguished entomologists with us. We had hoped to have the pleasure of welcoming the Hon. Mr. Dryden, Minister of Agriculture for Ontario, but unfortunately he has been unable to attend, but he has sent his Deputy, Prof. James, whom we are all very glad to see. We also have Prof. Webster, who has taken the trouble to come from Wooster, Ohio, to be present, as well as Mr. Fisher, Inspector of San Jose Scale for Ontario; Prof. Lochhead, of the Agricultural College, Guelph, and others, so that our meeting ought to be a particularly important and useful one, but as I unfortunately labor under the infirmity of deafness, I will call upon our Vice-President, Rev. Dr. Fyles, of Quebec, to take the chair and preside over the meeting.

Rev. Dr Fyles : I am very sorry that our worthy chairman is afflicted with deafness. I am very sorry on my own account. I would wish to express the very great pleasure I feel on seeing so large a gathering to-day, and I may say a gathering of distinguished men. We have a very important subject to consider—that of the San Jose Scale insect, which is doing so much damage in the United States and in Canada.

I am happy to say we have an authority on this destructive insect in Prof. Webster, from Ohio, who will tell us about the pest and his experience in connection with it. We have also our own Dominion Entomologist, Prof. Fletcher, who has given much attention to the scale, and I trust we shall all benefit by the opinions that these gentlemen can give us. There are others who will be able to speak upon the subject under consideration, and I will now in the first place call upon Mr. Dearness to commence the discussion on this interesting subject.

Mr Dearness : Mr. President and gentlemen. Yesterday evening I was asked to open the discussion on the San Jose Scale insect. I was aware that my name was on the programme, but I did not expect to have the honor of opening the discussion. I have hastily jotted down some notes by way of introduction.

Nineteen years ago Prof Comstock published descriptions of a number of Coccids in the Genus Aspidiotus, one of which he very appropriately named *A. perniciosus*. The first American home of this scale is supposed to have been in the San Jose Valley, California, and hence the popular name of the species. No one knows how long it had inhabited the fruit trees in that district before Prof. Comstock labelled it. One doubtful theory is that it had been introduced ten years before that time from Chili. It is pretty well settled that it is now about thirty years since its effects on deciduous fruit trees were first observed in California. Singularly enough according to Prof. Comstock's information the peach and apricot were exempt from its attacks. In Canada and the United States, if it thrives particularly well on any kind of tree, it is on the peach. Earnest efforts have been made to fix the date of its introduction to the Eastern United States. It seems established that the first extensive distribution of it was by the Californian nursery stock sent out by two firms in New Jersey twelve years ago.

This summer an unsuccessful attempt was made to fix the date of its importation to Ontario. It may be that some of that 1887 New Jersey stock found its way here. A trustworthy and observant fruit grower, Mr. John Vanhorn, of Chatham, testified this summer that he detected this scale in his orchard six years ago, the suggestion to look for it having come from a New Jersey nursery firm—the Parry Brothers—with whom he had had dealings. It is not out of the range of probability that it was introduced into the southwestern part of Kent county ten or twelve years ago.

From the scientific point of view the *Coccidae* are an interesting and attractive family of insects. It is also a large family. Although it cannot be said to be well worked up, Prof. Cockerell's check-list published three years ago gives 770 species, to which his supplementary list, published this year, adds 322 species. More than a third of these additions are in the section *Diaspinae*, to which the San Jose Scale belongs.

Some of these may yet, when they go abroad, rival the San Jose in destructiveness. Several of them are capable, and guilty too, of killing the plant upon which they feed, but at present and for the past five years the San Jose overshadows all its relations in economic interest on account of its destructiveness, The sagacious Comstock nineteen years ago declared it as his belief that it is the most pernicious scale insect in the country.

What makes it so pernicious? Several other species are as strongly armored. Its larvæ are longer exposed than many others. It does not seem to set up a morbid condition of the tissue of the plant on which it feeds ; like its congeners, it simply sucks the sap of its host. (It is true that its presence it characterized in some kinds of wood by a reddening of the subcuticular and cambium layers, but there is no distortion of the tissue as in the case of tissue affected by black-knot.) A gravid female does not contain nearly so many ova as a *Mytilaspis*. As a rule an insect that winters in the egg state, as the

oyster-shell bark-louse does, is safer than one that hibernates. What then gives the San Jose Scale its pre-eminence among its brethren as a plant destroyer?

First, it is the difference between addition and multiplication. A single brood of 600 is left far behind by a three or four-generation multiplication of even 50 or 60 In Ontario the over-wintered San Jose females begin bringing forth their young about the 20th of June. If by the 15th of July each of these over-wintered ones has produced 30 females, these are by the the latter part of August ready to produce say 50 each (the later mid-summer broods are said to number 200 to 300 females from each mother) giving a total of 1,500, and each of these 1,500 by the early part of October is multiplying by 50, totalling for the single season, in Ontario, a progeny of 75,000 females from each individual female that survived the winter.

It is probable with us that there are three full generations in a year. The possible ratio of multiplication is probably nearer 100 than 50. (It is said to be between 200 and 300 in the latitude of Washington). A ratio of 100 for three generations would give a total of a million. On trees in certain conditions and of varieties that have resistant bark, probably only a small proportion effect a connection with the sap channels necessary for them to complete their life cycle. There is pretty good evidence that a susceptible young tree may be overrun and literally sucked to death in three years. On the other hand, the increase of the insect on trees of a susceptible kind has in some cases been very slow. Mr. Honner, Amherstburg, testified that on a young peach tree in his orchard the scale had been most certainly established three years and yet in that time it had spread over but a small part of the tree.

Secondly, the comparative activity of the larvae and their plumpness at birth enables them to scurry around a considerable distance and to subsist a relatively long time before they perish for lack of food.

Third, its lack of fastidiousness in the flavor of its nourishment. Trees, shrubs, herbs, foliage, fruit and roots are neither common nor unclean to it. Mr. John Gordon, of Guilds, whose story of his efforts to save his orchard from the officers of the law, was truly pathetic, has spent time and effort without stint in studying and experimenting upon the insects in his neighbors' orchards since his own was burned. He showed Mr. J. H. Smith, B.A., and me, examples of the settlement of the insect and the secretion of its scale on fruit of watermelon, root of carrot, fruit of squash, leaves of poison ivy, garden phlox, high-brush cranberry, and hemerocallis. Besides some of the above he had artificially inoculated mulberry, basswood, blue beech, red beech, ironwood and elm. We found on September fourth and fifth, breeding females on hemp, pitch forks, rhubarb, burdock, horse-radish, erect door weed, oriental polygonum, hedge mustard, turtle-head, nettle, touch-me-not, potato, white ash, willow, nine-bark, rose, elm, basswood, currant.

The almost continuous running of the larvae, owing to the fact that they are produced singly over a period of several days, offers the means of their distribution by nesting birds, strong winds, horses and workmen engaged in the orchard, and fruit harvesters.

The desirability, nay the necessity, of checking, eradicating or controlling an insect so fecund, so omnivorous and so destructive as the San Jose Scale is at once impressed by a knowledge of its habits and capabilities. The usual restriction of animal life to its peculiar faunal zone makes some biologists hope that in our latitude this insect, even if let alone, could not become so destructive as in the latitude of Maryland. The extreme severity of the winter of 1899 proves that prolonged zero temperature, while it may weaken and check it, will not eradicate it. Its allies on our fruit trees are usually held in check by parasitic insects. In the trip just referred to, Mr, J. H. Smith and I were shown two trees the worst infested I ever saw with *Chionaspis*. Here and there were groups of the spinulous sloughs of *Chilocorus*. The owner informed us that there had been a great many more of those, but he had brushed them off and killed them. As frequently happens in insect fighting, he was spending his efforts in killing his allies. In one sample of Putnam's scale that I found on hickory, nearly every shield was perforated and its contents devoured by some insect.

I have not seen anything like this degree of havoc by parasites among the San Jose scale, yet it doubtless has its foes among both insects and fungi. Prof. Forbes, State Entomologist of Illinois, reports in Bulletin No. 56, that he has discovered in *Sphaerostilbe coccophila*, Tul. found by Prof Rolfs on the oak scale in Florida, an efficient fungous disease for the San Jose species. Most of the bulletins report that a little coccinelid beetle, *Pentilia mesilla*, preys actively on the San Jose Scale, and also that in some localities the twice stabbed lady-bird, *Chilocorus bivulnerus* has literally cleared the tree of the scale. Certain species of mites also prey upon it. On specimens collected in South Kent, I found a mite apparently feeding on the scale which Mr. Marlatt pronounces a species of Rhyncholophus and another much more common not yet determined.*

Mr. John Gordon, above cited, has been experimenting with the application of hot steam and a small proportion of coal oil. He is making use of one of his neighbor's trees that was nearly killed with the scale as an example of this method of treatment. (Specimen cuttings from this tree were exhibited. Branches cut off before the treatment still had numerous young scale larvæ running over them; while upon cuttings taken from the treated branches no surely living scale could be found.) Mr. Thonger assured me that Dr. Fletcher had reported 97 per cent. of the scale dead on the samples taken from the trees he had treated with a mechanical mixture of coal oil and water. The machine mixes the oil and water in definite proportions at the nozzles and projects the mixture as an "atomized" spray. Mr. Thonger seems to have confidence that if he had been allowed to repeat his spraying with the coal-oil mixture he could have eradicated the scale from his orchard.

Up to the present time the most successful and satisfactory method of remedial treatment is the fish-oil and potash soap solution. This is a soft-soap made with a special fish-oil and strong caustic potash, dissolved in water in the proportion of two pounds to the gallon. Accounts of the demonstration of the success of this kind of treatment on a large scale as made at Catawba Island, Ohio, under the direction of Prof. F. M. Webster and Mr. Willis H. Owen have been published and extensively circulated.

As Prof. Webster is here to-day I will leave it to him to describe the treatment and its results. The potash soap treatment was found to affect the trees so favorably there that growers who had not the scale in their orchards have used it generously. Mr. Owen said that over 17 tons were used last winter on an area considerably less than 1,000 acres. Mr. J. W. Gamble, President of the Ottawa, Ohio, Horticultural Society, for his annual address, read a paper entitled "The San Jose Scale as a Blessing in Disguise." His argument was that the scale had indirectly led the growers to discover the value of the soap as a general cleaner-up and fertilizer of their trees, and on peach-trees it had checked the destructive leaf-curl.

When the scale was first discovered in Ontario, the people thought it was confined to two or three situations and within narrow limits at these places. Had that been the case no wiser course could be taken than to cut down and burn the trees It soon became evident that it was much more widely established than at first suspected. The axe and fire is a primitive method of treatment for insects. Here is one that lives on the surface and has not the power, save in a restricted degree for a short period, of moving its position Surely science will not remain helpless and useless to kill that exposed insect and save the valuable tree upon which it feeds. In several instances more money has been spent in going over a tree with lenses to discover whether the scale was on it than it would have cost to spray it thoroughly. Drenching with the spraying machine will reach the parts that the lens will miss. The axe and fire method is dependent on the discovery of the insect and discovery is not always possible. Several other species of scale are liable to be mistaken for the San Jose one. By the fire method mistakes are irremediable; by the spraying method no harm comes to the tree though it be drenched with soap suds for harboring one of the native species of scale.

* Respecting the last, Dr. Howard wrote on the 23rd Oct., "I have to inform you that your scale mite has been examined by Mr. Banks, and he identifies it, with some little doubt, as *Hemisarcoptes coccisugus*, Lign. If not this species it is a closely allied one and belongs to the family Canestrinidæ. The species is the only one known in the genus, and is a parasite of Coccidæ, having been found in this country on the oyster-shell bark-louse, and in Europe on other scale insects.

THE CHAIRMAN: I am sure I voice the feelings of the meeting when I say we are very much obliged to Mr. Dearness for his carefully prepared and interesting notes. This Scale Insect is a most disobliging insect. I think with such a choice of fruit trees it should leave other trees alone.

MR. FISHER: What progress did this scale appear to be making on those trees, other than fruit trees, which had been artifically inoculated?

MR. DEARNESS: Those that had been artifically inoculated had not had time to mature when I saw them. They were only in the stage of brown and yellowish round scales.

MR. FISHER: Have you ever found scales on trees that had not been inoculated that appeared to be doing well?

MR. DEARNESS: On the Spiraea we found it doing well.

MR. FISHER: Is that a forest tree?

MR. DEARNESS: That is a shrub; and we found it growing on the elm and basswood but not doing so well as on the fruit tree.

MR FISHER: In this connection I understood there was a feeling that the Scale would flourish on the shade trees in the city of St. Catharines, and we made a very careful examination of the shade trees last year. We spent quite a number of afternoons inspecting the trees, with the result that we could not find any trace of the San Jose Scale on these trees notwithstanding that the neighbouring gardens were very badly infested. This year I thought it only fair there should be a further examination made as we found the Scale spreading to much more distant points, and yesterday we made a careful examination of Rodman Street and Geneva Street, with the result that we found no Scale whatever on any of the hardwood trees. The trees along these streets are hard maple and soft maple and elm and horse-chestnut.

THE CHAIRMAN: That would seem to say that the insect preferred fruit trees.

DR. FLETCHER: Are there any fruit trees infested by the Scale growing in the neighborhood of these trees?

MR. FISHER: There are currant bushes that are rotten with the Scale.

MR. DEARNESS: In reference to that allow me to point out that Prof. Comstock speaks of peach being excepted and apricot being excepted and certain kinds of cherry trees being exempt. We found elm and maple surrounded by badly infested trees exempt. These infested trees have been infested by wind, or men working among them, or by the harvesters. The insect cannot make its connection on the trunk of a tree like the hard maple, but if these insects were brought by these agencies and put up on the top of a forest tree, I cannot see why they would not grow there.

Because a fruit tree is exempt while others surrounding it are affected does not prove that the scale won't live on it. You will find in an orchard three or four trees badly infested and other trees that you cannot see any on right in the immediate vicinity. Here is a branch of a willow that is badly infested and the whole tree was infested throughout.

DR. FLETCHER: There is no question about its attacking the elm. It is one of the characteristics of the Coccidae that you will find a single tree very badly infested, and then touching that tree will be others perfectly exempt. That simply shows that a tree in a weakened state is more apt to be attacked than in a vigorous state.

MR FISHER: I never found elm infested.

MR. DEARNESS: Here is an elm that is infested (shewing a specimen).

DR. FLETCHER: Of course it is a new importation into Canada, and it is more likely to attack the same kind of trees that it has been feeding on, but at the same time we cannot argue that it will not work on other trees. In the first year of the introduction of the San Jose Scale into the Niagara district we could not find it on peach trees; it was

on pear and plum only ; but the second year it was all through the peaches. In Kingsville likewise it was on pears and plums first, and the next year we found it on the peaches.

What is the object of this discussion : is it not to bring out the known state of affairs in Canada in connection with this insect, its distribution, abundance, etc. ?

THE CHAIRMAN : Yes, and then what can be done to remedy that state of things.

PROFESSOR WEBSTER, Wooster, Ohio : I really do not know whether or not I can tell you anything new that will help you in your troubles. I have had experience enough with the San José Scale, goodness knows, but there are a lot of things yet to learn that I do not understand, and I should like to have it understood that I am not going to explain all San José Scale puzzles. I have a whole note book full of them that I cannot yet explain. You speak of the introduction of the San José Scale into Canada, but in another paper I will give you, I think that I can show you that it is not absolutely necessary to trace all introductions back to the two New Jersey nurseries. We had a nursery in Ohio of which I have never been able to find sufficient proof to convince me that there was not an introduction into that nursery before it could have been gotten from New Jersey. I cannot understand how the premises could be so thoroughly infested since that time. I have no proof of course but it has been a marvel to me and I do not yet understand it. I think I can give you some information at least that will point to a possible introduction in the east, independent of these two nurseries. In regard to the scale becoming established I will give you an illustration of a puzzle that came up. I wanted to get them into the insectary so that we could watch them closely. I planted some fruit trees in the insectary, not wishing to place the scale on those outside. I tried for two years to get the scale started in the insectary on those fruit trees, and it was only after two years that I succeeded. Three times I got limbs from infested trees outside, brought them in, tied them to the trees but we could not get one of those rascals to get off the old original limb and settle down where any sensible insect would. Another instance : I know of a row of peach trees where the pits were said to have been planted where the trees were growing, and about two and a half feet upward from the surface of the ground the trunks were totally crusted with scale. After a half hour's search I could not find a single scale on the limbs, and an apple whose limbs intermingled with those of the peach had no scales on it whatever. There were no infested trees near by.

As to natural enemies I have not found any in Ohio that give any hope whatever of any immediate relief. I suppose that in the course of years our native insects will prey upon it but they have yet to cultivate an appetite for it, just as we do for our oysters. I noticed the little black *Pentilla* very abundant in the orchards of northern Ohio last fall, but this spring I found that they had evidently been killed off by the winter just about in proportion as the scale was destroyed, so that the problem is in precisely the same position that it was before. This year there are not more than half as many of the natural enemies as there were last year. Speaking of the elm, if is is not burnt I can send you a section of an elm tree that is as badly infested as any fruit tree I ever saw, but I have not generally found it as abundant on the elm as on the fruit trees.

MR. FISHER : Do you find it often on the elm ?

PROFESSOR WEBSTER : I have found it bad in the nurseries and have found it in a small orchard growing up in the midst of the woods, where the young elm shoots were growing up from the old roots, these shoots being pretty badly infested with it. Wherever I have found elms intermingled with infested fruit trees, I have found the elm more or less infected but not always as badly. The first experience I had with the scale was in December 1894, when it was sent me from an orchard in southern Ohio, and the trees were very easily traced back to the nursery where they were grown. The first infested trees sent out from that nursery were not peach, because the peach stock was grown in another part of the premises and they were not infested, the points of infestation being near where the apple, plum and pear stock were grown, but since that we found it upon the peach. I did not know what was best to do at the time and the owner was in a desper-

ate state of mind and asked me if he could put kerosene on the trees. I told him he might if he wanted to but I thought he would kill the scale and presumed he would kill the trees also. He used kerosene thoroughly and, fearing that he had not been thorough enough, he used it a second time and I told him he had probably fixed the scale and his orchard too. I was surprised on learning that he had not killed his orchard, and the fact gave me hope that we might expect something from the application of pure kerosene. Some other experiments were made that did not turn out as favorably, as we killed the trees and since that I have been wondering why it would work satisfactorily one time and the opposite way at another. My assistant has applied kerosene to the same kind of trees, using the same brand of kerosene, and in one case it caused no injury and in the other case it killed the trees.

THE CHAIRMAN: Did he kill the insects in both cases?

PROFESSOR WEBSTER: Yes, he killed those that he reached. In some cases there would be individuals that were behind a bud, or behind some loose bark where he could not reach them, and I should not expect that a single application of anything, except fire, would kill every insect on a tree. Later, while dealing with the Catawba Island outbreak, we heard considerable about whale oil soap, and we used both kerosene and whale oil soap. The fruit commissioners got together and divided the trees into three grades. The first, comprising such as seemed to be too far gone to do anything with whatever, were cut down and burned. Then there were quite a number where it seemed as though, if we could destroy the scale at once, there might perhaps be a chance to save them, and I told these people that I would not be responsible for the results, but they might try kerosene: if there was any benefit to be gained they would get it, and that they could not do any more than destroy the trees and these would have to be destroyed anyway. In some cases the kerosene resulted fatally and, of course, that added to the number of trees that were destroyed. The other grade were such as were not so badly infested but what it seemed they might be saved, and on these they used whale oil soap.

Now, they have not exterminated the San José Scale on Catawba Island by any means. They have in this way simply got it under control by the use of whale oil soap. If the people persist in a proper way I think it can be exterminated. As it is they have simply reduced the pest to a point where they can control it; but just as sure as they give that over for a single year it will come to the front, and I think if they were to allow their premises to go two or three years there would be a great many trees that would not be worth saving.

PROF. JAMES: Has the fact of its being an island helped very much?

PROF. WEBSTER: I do not think so. The place is called an island by courtesy. It is only separated from the mainland by a swamp. There is really no bed of water between the island and the mainland. I do not think that has any effect at all. I do not see why they should have better results there than any place else if the same means were used. We have no law in Ohio that is good for anything. We have a law, relative to the suppression of peach yellow and black knot, and our Legislators thought it would be better to patch up the old law, and sandwich in a paragraph relating to the San Jose Scale, than it would be to make an entirely new one, and the consequence is we have a patched up law that is worthless, because no one understands or dares to attempt to enforce it.

All that has been done since 1894 has been by persuasion on my part, the only authority I have being that of referee. If there is a question between the Fruit Commissioners and the owners of an orchard, it has to come to me, and as my decision is final, there do not very many of these questions come before me. That is the reason why they had such good results out at Catawba Island. Mr. Owen was sharp enough to throw the whole responsibility on me, and he would tell these people that my decision was final and that would settle it. What has been done there, has been done by the persistent use of fire and whale oil soap, and appealing to the people to do the same thing and at the proper time. There is as much in that, or more than in anything else. It is not so much what the scale will do as we know that pretty well, but what the people will do with the scale.

I believe it can be exterminated, but it will take a great many years, and the control of treatment must be in the hands of some one man, and that man must not have a great many neighbors.

PROF. JAMES: What would you have that man do?

PROF. WEBSTER: I would put the whole matter of treatment and everything connected with it into his hands. If in some cases he saw fit to let the owner do the work, well and good, but he and not the owner should be held responsible to the Government.

THE CHAIRMAN: I suppose you mean he would have to be protected from his neighbors.

PROFESSOR WEBSTER: I guess if you would give him authority enough he would protect himself. If people come to learn that he can do the work better and cheaper than they can, there will be no trouble.

PROF JAMES: You would not leave the treatment to the owners?

PROFESSOR WEBSTER: I would leave no treatment to anybody except the one person whom you make responsible to your Minister for its being done properly, at the proper time, and if it is not, hold him alone responsible for it. If you put this work in the hands of the public you will get nothing done, even among very intelligent people We had an experience of that last week in fumigating nursery stock. A nurseryman wanted me to let my assistant go down and fumigate his stock. I told him if they would get everything ready, so that my assistant could get on with the work just as soon as he reached his destination, and go away just as soon as the work was done, I would let him go. He went down there, and he said they had a fumigating house that he could drive cats through. It was not at all adapted to the use for which it was intended and he compelled them to line it, and then they declared that it was absolutely tight, but after he started work and went outside he said the odor of the gas was very strong and they had to line it again. That shows how far you can trust people who are supposed to be rather above the average farmer and fruit-grower in intelligence. You must have some one person who does understand and make him responsible, and then see that every man has the proper measures and that they are applied in the proper way and at the proper time.

PROF. JAMES: Have you any regulation whereby you can decide whether a tree ought to be taken out or fumigated?

PROFESSOR WEBSTER: No sir, you must see the tree yourself. There are some varieties of trees that are almost worthless, and that would make a great difference. There are so many of these matters to look into that your chief officer must be on the ground and understand the situation in order to be able to decide. I do not know how it is in Canada, but in the United States there are some trees that were not worth ten cents before the scale came on them, but became suddenly valuable about the time they were to be destroyed.

As to the time, I have never found that we could do much except during the winter and spring. Summer treatment would only apply to the young scale. I do not believe you could apply anything to the trees, in the summer, that will destroy very many more than the young, without injury to the tree. During the winter season, when the foliage is off, of course, you have a much better opportunity of reaching the trees and the limbs, and with the exception of the peach you can use a much stronger mixture. You can then use a mixture that will penetrate and kill the scale. With the peach you can do this also, but it will destroy the fruit buds unless it is applied just when the buds are putting out in spring. There is a time just when the fruit buds are being put out when we can use the ordinary mixture, two pounds of whale oil soap to a gallon of water, without injury to the fruit buds.

I urged Mr. Owen to go to work and manufacture a soap that would be of a uniform grade. The great difficulty has been that we would use a certain brand of soap and it would seem to be thoroughly effective and not injurious, and I would recommend that same brand for some one to use and they would get entirely different results, and these brands do not, as a rule, analyze alike; so I urged Mr. Owen to manufacture a soap that

we knew would be of a uniform strength, and he has done so. I do not know that it varies particularly from Mr. Good's soap, only I believe it is more reliable, that is all.

PROF. JAMES: Has all the treatment on Catawba Island been under your directions?

PROF. WEBSTER: Not lately; I have not had very much to do with it the last year. The most that has been done the last year has been done independently by individuals. Of course, they brought a good deal of pressure to bear on those that were delinquent. I have had very little to with it after the scale was once gotten under control.

THE CHAIRMAN: It seems to me that we have come to these particulars through the able address of Prof. Webster. That the right remedy is whale oil soap, that should be applied in the winter and in the case of the peach when the tree is about to bud. What is necessary is a strong pull and a long pull and a pull altogether, or else that some one, with considerable powers of coercion, should be appointed to see that the fruit growers do their duty.

MR FISHER: I would like to ask Prof. Webster what additional benefits seem to result from the use of whale oil soap for the destruction of the scale.

PROF. WEBSTER: It is claimed, and I think with reason, that it acts as a fertilizer, and I would simply say that, to my certain knowledge, it has done so in some of our nurseries. It has been used a good deal stronger than was necessary in some of our nurseries, and when I asked why it was being used so strong the reply was that the stock that had been treated was a great deal more thrifty and in a great deal better condition than the untreated stock, and it was a question if it did not pay in that respect. I think as a fertilizer it has a very good effect. Some of our nurserymen are applying it to destroy the apple leaf aphis.

DR. FLETCHER: That is the potash?

PROF. WEBSTER: Yes, the potash, and, possibly, the fish oil also. Fish is a good fertilizer. I do not know to what extent it is a fungicide, but I do know that trees that were treated in the spring were exempt from the peach leaf curl, where the same variety, untreated, in the same row in the same orchard, was badly affected and the fruit nearly all destroyed. So, as a fungicide, to that extent it is certainly a very great benefit. This, and the fertilizing effects, are two very great benefits that would be gained by its use.

MR. DEARNESS: What about insect eggs on the trees?

PROF WEBSTER: That I do not know. It has been so stated, and perhaps it will prove true, that fumigation will destroy insect eggs. We have made no fumigation in orchards, but the longer we use hydrocyanic acid gas in treating nursery stock, the more we are convinced of its utility. With a proper fumigating house, and the fumigating done properly, we have never yet had a single living scale pass through the process alive.

DR. FLETCHER: How long do you keep the plants in?

PROF. WEBSTER: About 45 minutes. In regard to effect of kerosene, there was sent to me, I think two or three years ago, a limb that was cut off from a tree infested with the oyster shell bark-louse. The section sent was said to have been drenched with coal oil, but not only did the young bark lice hatch and live, but we actually got parasites from that scale after it had been treated with the kerosene.

DR. FLETCHER: Perhaps Prof. James can tell us if there are any fertilizing effects from the whale oil soap?

PROF. JAMES: Certainly not in the oil, but potash certainly would be very beneficial.

DR. FLETCHER: Is it not an expensive way of applying potash?

PROF. JAMES: Some contend it is not expensive. Last week, when I was talking to a lady who took over an old orchard near Philadelphia, she told me she started washing the trees with potash solution in order to clean the trees, and she said that the old trees that had not been bearing fruit for years commenced to bear. They seemed to renew their youth, and she said she thought it was a more effective way of applying potash to the orchard than by putting it on the ground.

MR. DEARNESS: There is one point that is of importance, and that is as to the time it injures the peach buds. It does not injure the buds of other fruit excepting peach.

PROF. WEBSTER: Not so far as we have learned. There is a possibility of a similar effect on some varieties of pear.

DR. FLETCHER: It is far better to do the spraying in the spring. One of the great defects in using soap is the want of uniformity. It is simply a matter of accuracy in making it, and the soap that Prof. Webster has used is practically the same potash soap made in an accurate way, so that you can look for the same results every time.

PROF. WEBSTER: I want to ask Prof. James if there is any way that a series of experiments could be carried out whereby we could get some definite idea, or some more exact idea, of the fertilizing value of soaps made of a certain strength.

PROF. JAMES: That is a very difficult matter. Analyses of soils are not very satisfactory, and you are experimenting with a living plant, which apart from the experiment might, or might not, produce. It is different from feeding an animal. Trees vary so much in their production, you might take a row of trees and treat them in different ways, but you are never perfectly sure.

A MEMBER: I notified Mr. John McMechan, who was Secretary of this Society some years ago, and who is a soap manufacturer, to be present here to day, and I also asked Mr. Heard, who manufactures spray pumps, to be present, but neither gentleman is here. I thought they might have been of some benefit to the Society, or we might have benefitted them in the manufacture of their products.

PROF. LOCHHEAD: I had the honor of attending the Commissioners during their trip to the west this summer. I was not able to be with them when they went to the Niagara District, consequently I cannot speak for that district. We saw in the western part, especially around Guilds, south of Blenheim, some effects of the San Jose Scale in several orchards. I think that even the most sanguine believer in the non-destructiveness of the San Jose Scale could come to no other conclusion but that it was a scale that was very destructive if left alone. Apparently the scale was first introduced into the Guilds District, in Mr. Warner's orchard, about six years ago, and from what I can gather, the attention of the neighborhood and of Mr. Warner himself was called to the death of some of his trees. From that orchard the scale has spread to other orchards, so that one of the most important conclusions we must come to is that the scale is extremely destructive if left to itself. Mr. Dearness has just given us very many instances of the destructiveness of the scale, and it lies with us to impress that fact upon the orchard-men of the Province. In the Kingsville District we saw one orchard, Mrs. Pulling's, originally one of the J. D. Wigle orchards, which was in a very bad condition. I did not see any dead trees, but the trees were in a bad condition. At J. D. Wigle's the scale had broken out in two or three localities; many of the trees that had originally been set out had died, and their places had been filled with fresh nursery stock. This nursery stock had not been fumigated, and consequently the infestation spread from several centres. Now as to the orchard to which Professor Dearness alludes, Mr. Honor's orchard, near Amherstburg, I may say that we were driven to the orchard one fine morning, and that we a saw a splendid object lesson on the effects of whale-oil treatment in an orchard infested with the oyster-shell bark-louse. The trees were large, and any observer could have told at once that they had once been in a pitiable state. I do not know whether Mr. Honor had scraped the bark-lice off or not, but undoubtedly the trees were in a good, healthy, thrifty condition at the time of our visit, and the old bark was sloughing off as if from old wounds. As a matter of fact, the trees had been almost bark-bound before. The recovery of the trees was not due simply to the death of the oyster-shell bark-lice, but it may be partly attributed to the removal of fungi and lichens that incrusted the bark, for I think very serious injury will be done to trees if lichens are allowed to incrust the bark. If the pores of the bark are stopped up, free interchange of gases is prevented, and partial suffocation takes place. The whale-oil soap solution also softens the bark so that it can yield freely to the growth of the tissues within

After this I had the pleasure of going down to Catawba Island in Ohio. There I saw another splendid object lesson in the recovery of that peach district from the

ravages of the San Jose Scale. There are three thousand acres in that island—almost one continuous peach orchard, so that there was no more favorable spot for the spread of the scale. At the begining of the experiments the owners had taken out, near the centre of the district, about three thousand trees before they began to try this whale oil soap experiment. Through the carefulness, persuasiveness and persistency of Mr. Owen, one of Prof. Webster's pupils, the fruit-men in that district were forced, in spite of themselves, to spray.

DR FLETCHER: How?

PROF. LOCHHEAD: Some of them did not believe in the soap treatment the first season, but when they saw the improvement in the condition of their neighbors' trees they sprayed the next year. Some of these men, when they saw the great improvement that had been done, said that the San Jose Scale had been a blessing in disguise. I need not speak further along this line, but shall briefly state four very important conclusions that I have been forced to draw from the work of this San Jose Scale Commission.

First. The scale cannot be exterminated from the orchards of Ontario by the efforts of either Government or people.

Second. Any radical method that aims at extermination should be discontinued. I mean by radical method the destruction of every tree that is infested.

Third. From our experience in Ontario, and what I saw in Maryland in the spring, I conclude that the scale is not quite so destructive in Ontario as it is in Maryland. We have not had it so long here as the orchardists of Maryland have had it. We have had it in Ontario seven or eight years, and although there has been quite a number of trees killed, not more than one or two whole orchards have been killed outright; while in Maryland one hundred acre, and two hundred acre, and three hundred acre peach orchards have been killed outright. At present we are not in a position to say whether the scale will act in that way here or not, but from what we saw in Kingsville, and from what has been seen in some other parts, it is possible it may become as destructive. I am inclined to believe that the climatic conditions will reduce to some extent the full reproductive capacity of the scale. I do not think it is possible that the scale will develope as rapidly in this Ontario climate as it will in the south in Maryland.

MR. DEARNESS: It is likely to have one generation less.

PROF. LOCHHEAD: There is one peculiar feature which inspectors have observed, and it is this, that the scale seems to gather force for two or three years without spreading, and then all at once, like a plague, it breaks out and spreads rapidly.

Fourth. The fourth conclusion is, that the scale can be held in check by the proper soap solution properly administered. I need not rehearse what Prof. Webster has said. He does not believe in letting the orchard men do this; it must be done by a corps of men employed by a Government Superintendent appointed for carrying on this work. Prof. Webster has given plenty of evidence of carelessness on the part of orchardmen, and the Ontario orchardmen are no exception to the Ohio men in this respect. I must repeat that the scale is a most pernicious one, and to say that it is no worse than the oyster shell bark-louse, or some other pests, is an absurd position to take. Its life-history and powers of reproduction are altogether different from the other pests. It is true that the San Jose Scale is confined to the plums, pears, peaches and apples, but it has the power of reproducing on other plants, so that I cannot emphasize too strongly the fact that this scale is a most pernicious one; and I do not think we should try to give out to the public that it is a pest at all overestimated. We must maintain emphatically that it has not been overestimated if we want to preserve the orchards. The scale is undoubtedly taking to our Province kindly. We find it in sections in the Lake Erie district; how far north of that district there has been no chance to determine. It has also been found at Belleville, and a few miles back of Belleville. Belleville has a far colder climate than this district.

This Society should do all in its power to inform the public with regard to the presence of this pest, and I would suggest that every public school inspector in the province should

be supplied with some good samples of the scale. This action would be safe, because the San Jose Scales soon die, and are perfectly harmless on a twig which has been cut away from the infested tree. Samples should be given to every school inspector so that he could leave them with the teachers, and give them an object lesson on the scale whenever opportunity offered itself. The teachers could ask the parents to call at the school and see the scale, and in this manner the public would be informed generally as to its appearance.

The Government has to rely upon the co-operation of the orchardmen themselves for future action against the scale, and when they find that no radical method of uprooting trees or burning them down is going to be adopted by the Government, they will come forward readily and report the presence of scale to the proper authorities. It would not be difficult for Mr. Fisher to cut down a badly infested tree and cut it up into little pieces, so that thousands of these could be distributed to the schools of the province. Even if the orchardmen find something that was not the San Jose Scale, let them inform the proper authorities and get information on the subject.

PROF. LOCHHEAD then read the following :

NOTES ON THE ECONOMIC ASPECT OF THE SAN JOSE SCALE AND ITS ALLIES.

The past year, 1899, has been a very eventful one in the history of Economic Entomology in Ontario. Early in April the Legislature passed the Fumigation Act, which compelled all nursery stock, with a few exceptions, to be fumigated with Hydro cyanic Acid Gas. To carry out this process of fumigation special air-tight sheds and buildings had to be erected by the nurseryman.

The Minister of Agriculture placed the conduct of the whole affair in the hands of myself, and I at once proceeded to make an inspection of all the nurseries for the purpose of instructing the nurserymen how to build their fumigating houses and how to fumigate. The chemicals were sent out from the Ontario Agricultural College in measured quantities suited to the capacity of each house. Very careful instructions were pasted on each parcel so as to reduce the danger from poisoning to a minimum. The substances used were Potassium Cyanide, 98% pure ; Sulphuric Acid, sp. gr. 1.84, and water. The quantities used per 100 cubic feet of air space in the house were 25/28 of an ounce of Potassium Cyanide, 1 1/3 fluid ounces of acid, and 2 fluid ounces of water. In this the Johnson formula was followed.

The work of inspecting the nurseries, of preparing the chemicals, and shipping them to the different places required much careful work on the part of the College authorities, for the shipping season of nursery stock was very short this year.

At the opening of the season many of the nurserymen were afraid the work of fumigation would delay the despatch of their orders, but it is believed that all received their chemicals in plenty of time, and that very few suffered from the anticipated delay by fumigating their stock.

From reports received from the nurserymen it must be acknowledged that the initial series of fumigation experiments in Ontario has been a decided success so far as the effects of gas upon the dormant nursery stock are concerned. Very few reported injury to the stock, and these few do not state definitely whether the injury was due to the effects of the gas, or to the effects of the very severe winter upon young trees.

It must be conceded that this successful initiation of gas treatment of nursery stock to prevent the dissemination of the San Jose Scale is another victory for Economic Entomology. The people are gradually being convinced that something can be done to help them in fighting pernicious insect pests.

INSPECTOR FISHER :—I came here at the request of the Minister of Agriculture only to answer any questions as to the condition of the country in regard to the San Jose Scale. It has been pretty generally discussed through the Commission and their report so that think that I can add very little to the information you have got from that source.

might say that there are only three points at which the infestation has extended to any great proportions, that of Niagara, St. Catharines and in the southern part of the township of Harwich, in the County of Kent, in the neighborhood of Giles. Outside of these there are a few other points where the infestation has spread to very narrow limits. In addition to this, and what seems to me the most important part of our work was that we were furnished with a list of the nursery stock which was supposed to be infested, in fact some of it had been found to be infested, This nursery stock was followed through every county in the province of Ontario without any exception, and last fall and this summer about one hundred points have been liberated from infestation by the destruction of these trees. We found the Scale in about one hundred places altogether and I was very much struck by a remark which was made by a gentleman living in the County of Elgin with whom a couple of Scale trees were found. He said to the young man who found the Scale and who assisted him in destroying the trees : "Young man every such case of Scale that you find, and destroy the trees, is worth to this country at least, $1,000." Figuring from that standpoint, the value of these trees and the destruction of them is worth to this country at least $100,000. We have not found Scale generally distributed outside the points I have named, and a few others where it is not widely spread.

Professor Lochhead spoke of the Scale as being in the neighborhood of Belleville,—it was found on these young nursery trees down there at Belleville. It withstood 22 degrees below zero quite safely, and at the time, I thought that was miraculous and I reported it to some of our entomologists and also to Dr. Howard of Washington who seemed to think it was extraordinary, but lately I have read a remark in a Bulletin published by Professor Newell, of Iowa, who said the scale would winter at St, Paul, Minn., where several times the mercury was 40 below zero, so that this Belleville matter does not cut any figure, and we may look for Scale in any part of this country. I believe we may look for Scale in any climate wherever trees will grow.

In the Bay of Quinte district in the County of Prince Edward, we have been examining and the examination is not quite completed, but we have not found Scale on anything but these young trees. The Counties of Elgin, Kent and Essex are being examined in the same way; in Elgin no Scale has been found except on these young trees, and in Kent we have found the Scale only in the township of Harwich and on the Town-lines on either side bordering on the township of Harwich. Then there are several points where these young trees were found and it was only at Kingsville where we found the Scale at all. I have noticed this summer that where the trees were allowed to stand and the Scale to accumulate the destruction was far-reaching and rapid. I have been astonished at the distance the Scale will go. It spreads most rapidly in the direction of the prevailing wind, and we can congratulate ourselves that in the district where it is most extensive the prevailing winds will carry them out into the lake. I think that insects carry the Scale a good deal. We have noticed in Niagara lately that owing to the exceedingly dry weather that has prevailed there, the grass seems to have lost its nourishment and the grasshoppers have taken to the trees for food. You can stand and watch them. Sometimes their flight is only for a short distance from one tree to another, at other times they will go away across the orchard. Frequently they fly for a considerable distance. Of course the Scale goes with them wherever they go. I have an idea of my own and I would like very much if some of these learned people would help me to work it out. I have been trying my best to solve the matter for myself, and I find if we put a mature male under the microscope and a little louse beside him the male is about six times as large as the louse, and I have an idea that the male Scale is responsible for distribution. They have broad strong wings and when they fly they go off with a bound, it is no feeble flight. They can go right up in the air like a lark, and I think them quite capable of carrying one or more of these mites with them; however, I have never caught them in the act, although I have spent a great deal of time trying to do so. I had a splendid specimen the other day. It is difficult to get these males where you can watch them, I found a splendid sample of Scale and I put it on a slide on the stove just a little warm and the warmth of the fire started him out and I watched the male Scale slide about on that piece of wood, and the way he figured on the stick was very instructive to

me. He moves about with a business air, he seems to think the whole responsibility of continuing the race rests upon him and he has no time to lose, and I have stirred them up with the point of my knife and watched them as they would fly as far as I could see them, and I have been surprised at the rapidity with which they can fly.

I think they will travel very much further than a few inches, I have watched them very often when they walked more than an inch in a minute. I have watched them at it many a time, and last October, about a year ago now, I was in the Wigle orchard and I found a pear tree there of which nearly the whole of the bottom had been cut away because of blight, and as a natural result of this the growth was strong. There were suckers there about that stump that reached up about six feet, and on the bottom of that young wood there was Scale. It may have been carried there by something else, but in my opinion it would be a very easy matter for them to get there from the stump of the tree, and if you reduce it to figures a little over an inch in a minute would simply mean an hour's walk to get up that stick.

I do not know how we are going to cover the ground by spraying. The past summer there is no doubt the Scale extended beyond the proportion it held at the beginning of the season. We have to spray the peach trees within how many days before blossom?

PROFESSOR WEBSTER: That would depend upon the season, sometimes it would be a very few days.

MR. FISHER: A good many instances have come to my knowledge where last year there was no Scale and now the trees are covered with scales.

MR. C. C. JAMES, Deputy Minister of Agriculture: I come, as your President stated, to take the place of the Minister who regrets exceedingly his inability to be here. I have come not to talk but to listen. As you of course are aware this subject has presented itself in very large proportions to the Department. As we went on with the work it opened out more and more, and unless you have had special opportunity of following the development, I am quite sure you have no idea of the enormous amount of work that has been done in connection with it.

The work done last year was quite extensive, and this year at least twenty-five thousand dollars will be expended in following up this microscopic insect. I do not know what we would have done if we had not had Mr. Fisher. He is one man in a thousand. We have given him the task and he has gone ahead with it, faithfully and energetically. I know that he and his assistants have been working, not simply in the day, but night and day, and the fruit-growers have been well served by him. (Applause.)

This question presents itself to the Department from various standpoints. As Professor Lochhead said, the Government cannot do everything; we can only direct matters and we hope to have the co-operation of the many persons who are interested. It seems to me that if, during the past years, we had had some instruction in our public schools as to the simple first principles of Entomology, we might have been wonderfully helped in this work. If the public school teachers had known a little more about insects, and had given the children of farmers and fruit-growers some instruction in the subject, we might have made a census of this Scale from one end of the Province to the other, and have started out on our work with more knowledge. Perhaps we would have been warned much earlier. We need more nature study in our schools.

A MEMBER: Mr. Dearness advocates that.

Mr Dearness is one man in a thousand along that line. There are very few school inspectors who take the interest in the matter that he does. What the Minister desires at the present time is to get some idea as how to carry on this work. Professor Webster says this treatment must not be left to the individuals. Must we send out a corps of men to look after this work? How are we going to introduce this work and carry it out successfully? If it is done it must be done thoroughly. We must employ for it only men who are competent. We feel that this is a question of tremendous importance, that the fruit-growing interests have much at stake in the matter. The further we have investigated it the more we have been convinced of the enormous risks we have been

running. The Scale was here at least six years before we really found it out. That shows you how easily it can avoid the observation of the fruit-grower. If it can so readily avoid observation you can see at once that it presents a very serious problem. You have been told of only one of many things we have done. Let me add another fact. We went to the nurserymen who had unintentionally introduced infested American stock, we obtained lists of the men to whom the stock had been sold, and then we endeavored to trace every one of these sales. In some cases the stock had gone through the hands of two or three persons. All these trees were gradually traced and examined at their final location in the orchard. Take the case at Belleville. The stock had been auctioned off on the market-square and nobody knew where it had gone. That stock had to be found and most of it has been examined.

If you have any suggestions as to how this work is to be carried out, we would like to get them. Our interests and the fruit-growers' interests are the same. Some people thought we were moving too cautiously and considering personal prejudices too much; others said we were pushing on too vigorously and are asking us not to move so rapidly, to take out only those trees that are badly infested and to allow them to treat the rest. Professor Webster says that if we allow the owners to treat, nothing much will result, and that the Government must come in and do the treating if it is to be done thoroughly. What is your opinion as to what should be done? Any suggestions that will help us will be exceedingly acceptable.

Doctor Fletcher: We have had this afternoon a discussion on one of the most difficult and important subjects which entomologists and fruit-growers have ever had to deal with. It is wise, I think, that we should look at the matter squarely and find exactly where we are. We have had our society here for a great many years under the patronage of the Ontario Government, striving hard and doing good work for the country. We have done much excellent work this afternoon in this discussion. The Government has shown a manifest desire to get at the real facts with regard to the San Jose Scale, so that the wisest legislation may be enacted. To-day we have here the Minister represented and the Provincial entomologist and the Provincial Inspector of San Jose Scale, and we as a Society should recognize this compliment. These men have come here to assist in the discussion and give us the benefit of their experience in working out this problem that we have still to solve. I suppose like every other man I change my views very often. I hope so, when new evidence warrants it; but with regard to the treatment of the San Jose Scale, I have not changed much yet. If I am asked what my views are I can only refer you back to my annual reports for the last three years; every year the same thing. There is no doubt in my mind, or in the mind of any one else that understands these insects, that this scale is to-day, what Prof. Comstock said many years ago, the most pernicious insect we have ever had to deal with. As to how long the insect has been in Canada, notwithstanding all that has been said, we all know well that it was only discovered in Ontario in Mr. Vanhorne's orchard in the spring of 1897, (See Cent. Exper. Farm Rep. 1897, p. 213) and we also all know how quickly it has spread.

Now can it be treated? I acknowledge that it can be treated if—and there comes the rub—if you can get specialists to undertake the work and if you can teach the whole of the fruit-growers in this country that *they are* concerned, that the whole welfare of the country is concerned and that it is their duty to do what will give them some little trouble and expense, but will save the whole province from an enormous loss, I say you cannot do it and you will not do it yet, and I maintain that the time has not yet come when the prosperity of the whole Province should be put at the mercy of men that we know beforehand are not going to do their duty because they have not yet learned that it is necessary. This is not a time for dilly-dallying, and it would appear as if there is little choice for the Government as to their future actions. However, I consider the matter is such an important one that I shall do my utmost to show the danger which I believe exists. Is Ontario going to act in haste and allow a thing to be done that everybody should know is very

dangerous, namely, the suspending of the San Jose Scale Act, because a few people who lose a few dollars are making trouble about it? All I can say is that they will repent at their leisure. On page five of my evidence before the last Agricultural Committee at Ottawa, last spring, I spoke rather fully of this matter and I shall be glad to send a copy to anyone who wishes for one. I believe the time has not yet come when we can trust the fruit-growers to treat their trees with sufficient care for an insect like this and protect Ontario from a very great ill. Now, it is a very great ill. Mr. Fisher who is a most accurate, careful man and the one man in Ontario who has had the best chance to see exactly what the effect of this insect is upon orchards, tells us that since the Government relaxed its efforts the insect has decidedly increased.

Is the insect only to be compared with oyster-shell bark-louse? Numerous writers have written and said that it is and is only an ordinary insect. This I say emphatically is nonsense and dangerous nonesense at that. I should like to see an expression from this Society, as a Society, commending most heartily and thoroughly every step that Mr. Dryden has taken in this matter of the San Jose Scale. I did not agree with him at first, but looking back over the history of the infestation during the past three seasons and it is only three seasons, I say I do back up, most strongly and thoroughly, every step he has taken. He has been wise from the beginning, and I say this with all the light of the experience I have had, which is a great deal. I think the operations of his department are to be commended at every step, and to-day I hope that public opinion will back him up and that instead of relaxing the efforts of the department that he will continue to do good for the country as he has in the past.

Mr. Dryden would have been here to-day if possible. He has sent us assurances that he could not come here on account of important business. I know personally that he had intended to be here. He has been worried and had great anxiety over this matter because he wants to do what is wise for the country and that is the only thing that has guided him in carrying out measures to protect Ontario fruit-growers, who as a whole have misunderstood him. He has taken steps to destroy all infested trees. He has appointed efficient inspectors, and I lay great stress on that title of efficient inspectors, for I believe they are efficient. I have been in consultation with them through the whole of the work and I do not remember a single serious mistake that has been made by them. Prof. Lochhead is in the same position. Prof. Webster has been consulted and I say that the work has been most remarkably accurate for it was a work of very great difficulty and I maintain that the title of efficient inspectors should be applied to our inspectors. Notwithstanding what was said by some before the commission, the work has been good and of enormous importance to this country; I say it is of enormous importance because directly the efforts to control it stopped the enemy has increased and it is now much more difficult to overtake it; however, I believe it is not impossible to eradicate it even now. I cannot see that it is impossible to eradicate an insect that is once placed under control. When you have got a thing under control it means that you can do what you like with it. When we know that the insect is practically restricted to three small areas in Ontario, I say it would be a thousand pities if the country does not back up the Minister in wiping it out altogether. Some of the owners of infested trees who hid that fact and are now complaining that the compensation is not enough, are themselves responsible for the failure to eradicate the scale. Some of the destroyed trees have been paid for to the extent of one quarter of their value. Let them congratulate themselves on having received any compensation from the Government. What takes place when we are visited by an epidemic disease? Does the Government come forward and say: You have lost three children we will therefore give you three hundred dollars? Not a bit of it. I say the fruit growers have largely themselves to thank for the danger they are in, they have bought from infested districts after they have known well that there was great danger.

Before the San Jose Scale was in this country a warning was sent out saying there was an injurious insect that we were liable to suffer from. "Don't get poor stock, or don't get it from infested localities." But when we give an object lesson the fruit-growers won't even take the trouble to walk across the road to see it. As to the treatment being

left to the fruit-growers throughout the country, if that is done by the Government it is simply throwing up the sponge, and I believe it means the wiping out of the fruit industry throughout the Niagara Peninsula for a long time, because I maintain that the San Jose Scale is still with all of our latest knowledge one of the worst enemies we have ever had to fight against.

The treatment of it, if persisted in as it must be to succeed, is expensive and more trouble than these people will go to as a class. Let me give you one instance. Every fruit-grower knows that he can save fifty per cent. of his apples by spraying to prevent the codling-moth injury. I ask you, gentlemen, to think among your acquaintances how many *ever* spray. It is true ten years ago there were perhaps not more than one hundred spraying pumps in the country; now there are perhaps a hundred thousand. That means we have some thousands of good business men who want to save their money; but are there not hundreds of thousands who don't do it, and that with a big caterpillar nearly an inch long which they can easily see? That being the case how can we expect that they will do it with an insect you cannot see, except by the use of a microscope, even when the trees are swarming with them?

I agree with Mr. Lochhead in everything he said. The Scale is not quite so destructive in Ontario as in Maryland. I have here a photograph of an orchard of 28,000 trees, absolutely destroyed in three years from the time they were infested. What was the value of these trees? An average of $5.00 apiece at the very lowest estimate. They were wiped out in three years and the whole orchard wiped away. That is what the San Jose Scale can do in the South.

Then we have some accurate statistics telling us about the rate of increase of the Scale. The increase of the Scale in Maryland and the Southern States is 300,000,000 from one in a year; let us reduce that, because we are further to the North, and say it is annually increased half of that number, 150,000,000 from one in Ontario, is that not enough? Is not 150 millions from one insect enough of an increase in a year? Then they say it is not likely to come up here in the North and do harm. The plague of London is the same black plague of Asia, but it spread up into England and in 1665 wiped out the greater part of the population of London. We know the San Jose Scale is a bad enemy and we do not want to play with it.

We have got it now measureably under control and we should let the Ontario Government go on doing what they have done, and as I say, every member of this Society ought to back them up in doing it. The Ontario Government has certainly been a benefit to the whole country in this matter, not only to Ontario but the whole country, and I say we should back them up and say that we appreciate the great efforts they have made and I do hope Mr. Dryden may long be the Minister of Agriculture to carry on the administration of the department. I am not a politician. I am a Government servant. I never cast a vote and as long as that is the case never mean to. I do not care whether a man is a Liberal or a Conservative. It is nothing to me; but I say here is a man who is a good servant doing good work for the country and work that has been done in the best way, and to stop or hesitate now is bad for the country. What are we going to do in the future? I say let us help him. We have with us to-day Professor Webster: we have known him for a great many years; one of the first economic entomologists in the world; one of the first in America and that means the world, because with the exception of Miss Ormerod they hardly know what economic entomology is on the other side of the water. Mr. Webster is a man that would tell the President of the United States:—"You are wrong," just the same as he would me or any other insignificant person, if he thought so. We have him here and if he advises us as to the best treatment, let us listen to him. Experience has taught us, there are two good things—treatment with hydrocyanic acid gas and spraying with kerosene. These are so difficult to use safely that people won't, I feel sure, take the necessary trouble. In the whale oil soap we have a remedy easy to use, not very expensive, but a little more expense than our fruit growers will go to after the first year. They are not going to pay the price of even three cents a pound for the amount which will be necessary to control the pest after the first year.

MR. DEARNESS:—You can get it for two cents a pound now.

DR. FLETCHER:—They won't go to the expense of two cents a pound for it. It takes a good many pounds to go over an orchard and after the first year I don't think we can trust our fruit-growers to do that work. This is no experiment. Many things *can* be done that are not, if they cost money and trouble, it is the same with the hydrocyanic acid gas If Prof. Webster was going to fumigate trees, I would say he can kill every Scale, but an ordinary man will not do it. We have to deal with the actual defects which commonly occur in mankind. The thing is practicable if carried out properly and the man who makes the statement that it cannot be carried out is not a practical adviser. If we can teach the fruit-growers of this country that it does pay them and can persuade them, well and good, but I doubt it. For ten years I have been working on this kind of work and I know only too well there is a great deal of difficulty in persuading people to do even what will save them money, when you go to the orchards and houses of fruit-growers and see the way they do this work of fighting insects. I was in the fruit house of a fruit-grower whom I persuaded to buy a pump, and I said "Where is your pump, why don't you use it?" He said, "We did not use it this year, there is no crop." Another man wrote to me from British Columbia showing great interest in spraying. "What is the best kind of pump? I want to get nothing but the best," etc., etc. I was in his orchard this summer and asked him about the pump. He said, "I have not unpacked it, I have been too busy." He imported it from here, got it out there and then had not time even to cut the string that tied the handle on to the pump!

I approve most heartily of the measures adopted to wipe out the San Jose Scale by the Provincial Government and I shall help them in any way in my power. Of course, politics are a very different thing from entomology. As an entomologist I say the work was well done. I do wish to express my appreciation of the work that has been done by the Government, of Professor James for his activity in the department, and Mr. Fisher in his honest and straight-forward dealing with this question. I said to Mr. Dryden last year, "If Fisher has got to go into an orchard and find the San Jose Scale he will treat his own brother or himself as he would anybody else and will destroy everyone of his own trees if he finds them infested." At first Mr. Fisher was a specialist, now he is an expert both as an entomologist and as an enthusiastic man, and I say to-day is the time for people to acknowledge it for the country should know it. We must recognize this question as one to be fought out It is a serious matter and we have not got to the bottom of it yet. Let us have every suggestion that will help us.

THE CHAIRMAN:—I think we should not undervalue the force of example. There is a place called Abbotsford in the Province of Quebec, one of the few places where apples are grown to perfection. There was an intelligent fruit-grower there, Mr. Charles Gibb, who took to spraying his trees, and I know that a few years afterwards there was not a man in that neighborhood who did not spray his trees. Whether they continued to do so I do not know; the example was catching. Would it not be possible for the Government to induce some good man in one district that has been referred to, to spray his trees and to watch the result and see whether his neighbors would not catch the idea from him and follow up his method? Whatever other plan may be taken by the Government it seems to me that the power of example should not be overlooked. We have had a very valuable amount of instruction to-day, and if there is any one else who would like to make any remarks we would be ploased to hear him.

Mr. W. E. Saunders then moved, seconded by Mr. J. Law, that a committee be appointed to draft the resolution asked for by Dr. Fletcher, to consist of Mr. Lyman, Dr. Bethune, Dr. Fletcher, Mr. Balkwill, Mr. Dearness and Mr. W. E. Saunders. and to report at a later session of the meeting.—Carried. The meeting then adjourned.

EVENING MEETING.

A public meeting was held in the hall of the Y. M. C. A. building at 8 o'clock. There were about seventy-five persons present, including the Right Rev. Dr. Baldwin, Bishop of Huron, and many ladies. The proceedings were opened by the Rev. Dr. Bethune, who cordially welcomed those present, and introduced the President, Mr. Henry H. Lyman, of Montreal, who delivered his annual address as follows:

THE PRESIDENT'S ANNUAL ADDRESS.

By Henry H. Lyman, M.A., Montreal.

Ladies and Gentlemen:—It is again my duty as well as privilege to address you at this the thirty-sixth annual meeting of our Society, and to congratulate you upon the continued success of its work and the high standing maintained by its monthly journal. At our last annual meeting it was a matter of regret that so few members from headquarters were able to attend, but it was a great treat to the members of our Montreal Branch to have the meeting held in that city, in connection with the celebration of the twenty-fifth anniversary of the formation of the branch, as it was the first opportunity that our members had had of attending an annual meeting of the parent society since 1882, the only other occasion when the annual meeting was held in Montreal.

In beginning my address last year I dwelt upon the difficulty experienced by an amateur entomologist in composing an annual address, but if I was in difficulties last year, I am in much greater straits now, as not thinking of a second term in the presidential chair, and following the scriptural injunction to "let the morrow take thought for the things of itself," I not only put into that address almost everything I could at the time think of, but also all the items of interest that I could beg or borrow of my friends, and now find myself somewhat in the position of a clock which having struck twelve has to come down to striking one.

Last year I had, shall I say, the temerity to lay before the meeting a great many suggestions, the adoption of which would, I ventured to think, be of material benefit to those engaged in the prosecution of studies in this science, but I am not aware that the slightest movement has been made towards the adoption of any one of them.

I hope that it was not a case of a fool rushing in where angels, if there are any entomological angels, fear to tread, and shall, in order to save my amour propre, at least try to believe that it is only another instance, of which there have been so many in the history of the world, of a reformer being in advance of his time. But while the non-success of my suggestions last year should, perhaps, be a warning to me to leave the making of suggestions to more influential persons, I cannot refrain from re-iterating the opinion that a well-organized Entomologists' Union, on similar lines to those on which the Ornithologists' Union is carried on, could be made of very great benefit to the science of entomology.

Last year I ventured to point out a number of matters which such a union could deal with to advantage but many more could easily be suggested. I recently had an example of the necessity for such an organization for the settlement of matters of nomenclature. A gentleman friend, not a naturalist, but only one who takes a sympathetic interest in such studies, invited me into his office and proceeded to describe enthusiastically the beautiful chrysalis of our milkweed butterfly which he had been shown by a gardener who had found it, and when I said I knew it well, he rashly asked me its name. Immediately I was in a quandary, should I give him only one name, choosing maybe that which I might myself prefer, or should I risk his mental equipoise by plunging him without preliminary training into the vortex of the battle of the synonyms? After a moment's hesitation I decided upon a compromise giving him his choice of three names, writing down, lest even these should be too great a strain upon his memory, that

it used to be called Danais Archippus, but that many authorities now hold that it should be called Danais Plexippus, while Dr. Scudder calls it Anosia Plexippus, and as they say, I let it go at that.

Last year I suggested, as one of the things which such a union could deal with, the question of a uniform standard method of pinning and spreading specimens, but there is another point in this connection upon which a recommendation might be of some service, and that is in regard to setting a fair number of specimens to show the under side. Nothing has caused me greater surprise than finding large and important collections of butterflies without a single underside showing. I defy anyone to separate the North American species of Argynnis, Colias, Grapta, and a number of other genera from a study of the upper sides only, and when I am shown ten or a dozen cabinet drawers filled with specimens of Argynnis with not an underside among them, the effect is simply maddening, and I am sure that an attempt to study this group under such circumstances would speedily reduce me to a state of utter imbecility. In the magnificent work of Mr. Wm. H. Edwards the undersides of the species treated of are invariably shown, and why they should be excluded from the cabinet I cannot conceive. The failure to show the undersides of the species not only renders the study of types much more difficult but also greatly endangers the types as it becomes necessary to remove the glass covers of the drawers and handle the specimens in order to see the undersides.

Another point which could with great advantage be decided by such an authority is the nomenclature of the larval rings. Considerable diversity has existed upon this subject, some authors counting only twelve segments, excluding the head, while others, and doubtless the majority of recent years, have, possibly to show their superiority to antiquated superstition, made the number thirteen by counting the head as number one. But one is still frequently in doubt as to which method an author follows until one has made a careful study of the description. Would it not be better to discard both these systems and follow that adopted by Dr. Scudder, and divide the larva into head, 1st, 2nd and 3rd thoracic, and nine abdominal segments? Under such a system there could be no possibility of any misunderstanding.

Last year I ventured to assert that we should never have a natural and therefore scientific and satisfactory classification of the Lepidoptera until we know them in all their stages, and if this is admitted, the importance of working out the life histories becomes immediately apparent. An encouraging amount of this work is now being carried on though very much less than might and should be done. The reasons for the paucity of this work are not very far to seek. In the first place there are not half enough entomologists, and those that we have are generally overworked. The amateurs, like myself, are generally only able to snatch a half hour or so at a time from their regular occupations to do such work as describing preparatory stages, which can only be done satisfactorily by daylight, while many who are much less favourably situated cannot even do that. Many, unfortunately, care only for accumulating a collection of imagos, and in the case of these we can only hope that they will grow from mere collectors into true entomologists, but probably the chief reason why more do not take up this interesting and important work is its inherent difficulty. With many species it is easy enough to secure eggs and to rear the species through all their stages, but to make descriptions of those stages which shall be of any use to a specialist is generally speaking a very difficult matter unless one has had very special training. This is, of course, largely due to the great advance of our knowledge, the requirements of which have become continually more exacting. The older authors, those who have been called the fathers of entomology, were certainly more comfortably off in this respect, as it seems to have been considered sufficient to give such descriptions as the following: "Senta Ulvæ; Larva, yellowish ochreous, with several fine lines. In reed (Arundo Phragmites) September, March, April," or "Xanthia Aurago; larva grey, with oblique darker streaks, on beech in May."

Nowadays such descriptions would not do as we are expected to note and describe everything, down to the minutest detail. We must begin with the egg-laying by the parent and go through all the stages to the imago.

Many hints and directions for the uniform description of larvæ have been published from time to time. Such a paper from the pen of Dr. William Saunders appeared in the second volume of the "Canadian Entomologist," and our society published forms for this purpose, but for some reason, possibly from their not being listed with the other entomological supplies, they were not much used. But these hints and directions, though excellent, are hardly up to present requirements.

The following are the directions of Dr. H. Guard Knaggs in his Lepidopterist's Guide for the young, not the veteran, collector.

"In carrying out observations upon the egg state, the student should note :—

How the egg is laid : Whether unattached or attached ; or if so, by what means, and also by what part of its surface ; the position of the female (and of her abdomen) at the time of laying—whether hovering, at rest, or in what other act ; whether the eggs are laid singly or in batches, and, if so, in what number, and whether unarranged or how arranged ; also the total number deposited and whether nude or covered, and, in the latter case, how covered or protected, together with any exceptions, individual, special, natural or abnormal.

When laid : At what date or dates, at what time or times of day or night ; at what intervals, how long after copulation and how long after emergence of the female.

Where laid : If not on the food plant, where ; if on the food, the exact position.

The duration of the egg state, in species and in individual cases ; influences of temperature, soil, locality, altitude, time of year, etc., which promote, retard or modify the natural changes.

The appearance of the egg itself, as to form, colour, or colours, markings, elevations, depressions, and sculpture on the surface ; together with changes, normal as well as irregular, from the time of exclusion to that of hatching.

The mode of exit of the larva should be exactly observed and any other remarks or experiments which may present themselves to the student, should if possible, be followed up ; such as, for instance, those of proving how long the egg state may continue (i.e., the ovum retain its vitality) with a view to throwing light upon the, at present, hidden causes of the disappearance and periodical re-appearance of certain species ; and of discovering if there be any sexual arrangement of the eggs, as laid, to account for the emergence of a preponderance of one sex of the future moth at one time, of the other at another, from the same batch of eggs.

In describing, the best order will be to give the names of the parent species, and then, by the assistance of microscopical examination, in their order, the measurement, form, sculpture, colour, markings and changes ; the arrangement of the eggs, time, situation, etc., after which a diagnosis from the allied species may be added, as well as any further remarks which may suggest themselves."

So far Dr. Knaggs, and when we have got that far, mind you, we have only got these little creatures out of their eggs, and I might go on at great length giving the directions for observing and describing the caterpillars, but I spare you. Let it suffice to say that we are urged to carry out the observation and description of all the succeeding stages, with the same care and attention to all the possible and impossible minutiæ ; but surely this is a "counsel of perfection" unattainable by ordinary mortals, and especially by busy men.

But even taking a much lower view, the standard expected is still high. We have before us a little creature, perhaps barely a tenth of an inch long, divided into a head and twelve other segments, upon each of which there are various appendages, and we are expected to describe all these things correctly in spite of the fact that the owner of the appendages is constantly crawling out of focus, and perhaps after all our trouble, when we think that we have drawn up a fairly correct description and venture to publish it, some subsequent observer, in a "criticism of previous descriptions," perchance accuses us of having put some appendage upon the wrong segment. Of course, when we have

abundant material we can kill a specimen or two occasionally in the cyanide jar and then describe them at our leisure, but often we cannot spare any for this purpose, especially in the case of species which are difficult to rear.

Occasionally we come across a species, the larva of which is easy to describe, but as a rule it is very difficult to make a satisfactory description. The markings are often puzzling and the colours are frequently indescribable, it being almost impossible to give them names. This chiefly arises from the more or less translucent nature of their bodies and from the way one shade melts, as it were, into another. In many cases in which there is not much change after the first moult, we still notice, as the larva grows, certain things which we had not noticed in the earlier stages, and then we are haunted by a horrible uncertainty as to whether these points have really developed in the later stages, or were only overlooked when the creature was much smaller.

But, doubtless, the chief difficulty in the way of the general preparation of useful descriptions of preparatory stages is that probably at least nineteen men out of twenty do not know what are the chief points to be observed and described, and hence we find some men describing, with conscientious and laborious exactness, organs or appendages which are common to at least all the larvæ of the particular group to which the subject of their observations belong, or on the other hand, contenting themselves with making the slightly vague statement that there are "a number of warts with radiating bristles on each segment."

To overcome these difficulties and to bring the work of as many observers as possible into harmony, it seems to me that we require a simple but comprehensive "Manual" for the study of preparatory stages which, while avoiding diffuseness and unnecessary technicalities, should still be precise and explicit, taking only the most elementary knowledge for granted, and as fully illustrated as possible; not only showing a figure of a typical caterpillar, but having outline figures of all types of larvæ, showing how organs and appendages are modified and how they can be homologized, and with the fullest particulars of the important points to be observed in each type of larva, and with typical descriptions drawn up from common and well-known larvæ as models.

After a careful study of such a work with as many specimens as we could conveniently lay our hands on, we would be in a position to make thoroughly useful descriptions because knowing what we should look for, we would not overlook important points, but would find them, if present. But I shall probably be asked who is the man for this task, and in reply would say that, in my humble opinion, Dr. Harrison G. Dyar, who has made such extensive studies upon many different groups of larvæ, is well qualified to undertake it, and it could probably be issued as an official bulletin by the Department of Agriculture at Washington.

Another work which is also much needed is a supplement to the "Bibliographical Catalogue of the Described Transformations of North American Lepidoptera," prepared by the late Henry Edwards, and issued as Bulletin No. 35 of the United States National Museum in 1889; or what would be still better, a revised edition brought up to date of the same work. Such a work is most important in order that people may be informed as to what work has already been done, and what is lacking to fill up gaps.

I have said that a knowledge of the preparatory stages is necessary for a satisfactory classification of species, but I believe it to be also necessary in some cases even for the discrimination of species. An extremely interesting case of this kind is that of the two forms, or as I believe them to be, the two species of Halisidota, viz. Tessellata, A and S., and Harrisii, Walsh. You are doubtless aware that as long ago as 1864 the late Benjamin D. Walsh called attention to the fact that there were two kinds of larvæ of Halisidota producing imagos which were indistinguishable, one being the species named Phalæna Tessellaris, by Abbott & Smith, but now known as Halisidota Tessellata; and the other an undescribed form or species which he named Halisidota Harrisii. These two forms of larvæ differ remarkably, and would never be taken for anything but species of the same genus. The larva of Tessellata, as you know, varies remarkably, but only within well-known limits. The body is usually black or blackish; the head generally black, but

occasionally tinged with reddish brown, the feet black, the prolegs blackish, the hairs cinereous, blackish on the dorsal ridge, or a yellowish-brown with darker ridge. Occasionally one is found when about half grown of a gamboge yellow, with a tinge of pink in it, but these change before maturity to one of the usual types. The principal appendages are four pencils of black hairs, with white pencils below them on the thoracic segments, two each on the second and third thoracic segments, and two black pencils on the eighth abdominal segment. There is also a lateral white pencil on each side of the second thoracic segment and some long hairs on the ninth abdominal one. In Harrisii, on the contrary, the body and hairs are milk-white up to the last moult, the mature larva being of a rather dingy brownish-yellowish shade, slightly darker on dorsal ridge. The head is yellowish-brown, while the pencils, which are black in Tessellata, are orange in Harrisii, except that there are no orange pencils on the posterior part of the body, but only two whitish ones projecting backwards on the eighth abdominal segment. The feet are yellowish, tipped with reddish-brown, and the claspers whitish. Thirty-five years have now elapsed, and yet the question as to whether these are distinct species or only interesting varieties has not been definitely and satisfactorily settled, a fact by no means creditable to North American lepidopterists.

Some years ago I became interested in this question, and with a view to making experiments imported and set out in our Mount Royal Park in Montreal a plane tree (Platanus Occidentalis). It has now grown to be a fair-sized tree about 25 feet high, and last year I began my experiments by securing the eggs of Tessellata. These in due time hatched and were divided between several glass breeding jars, in one of which I had leaves from my plane tree, and in the others oak, bass and other trees. I had no difficulty except with those on the plane, but they refused to eat. Fearing they would starve immediately I gave them an oak leaf for a start, and after they had had a meal or two took it away and left them only the plane. This hunger forced them to partake of sparingly, but they did not relish it, and the mortality was heavy. A number passed first moult, but I only succeeded in carrying two past the second, after which they died.

This year I appealed to Dr. Dyar to try to get me specimens of H. Harrisii, and he and his assistant very kindly devoted part of a day to looking for them, but they were only successful in finding four. These were sent me, but naturally I was not able to make many experiments, and only found that while they preferred plane they would still eat bass and elm. The larvæ, are however, so very distinct from Tessellata that it seems probable that the species is distinct in spite of the imagos being indistinguishable. I would be inclined to lay down a law that where any two forms are certainly distinguishable in any of their stages, and where the two forms are never found to breed, the one from the other, or to occur in the same brood, they are entitled to rank as distinct species.

The truth in regard to these particular forms ought to be easily investigated in any locality where Harrisii occurs in moderate abundance. All that is necessary is to secure a fair number of larvæ, and when the moths are disclosed from the resulting cocoons to mate them and then secure as many eggs as possible, preserving the parent moths and keeping the batches of eggs separate. If under these circumstances the larvæ were all of the Harrisii type it would be fair to conclude that the form is a good species, though it would be all the better if a further experiment were tried, viz., to see if Tessellata and Harrisii would mate and produce fertile offspring with characteristics of both forms in the preparatory stages.

I have thus attempted to show the importance not only of the study of preparatory stages, but also of experimentation therewith, but there are many other and more practical subjects for study and experimentation than those to which I have alluded, such as the possibility of propagating and disseminating bacterial diseases among caterpillars as a means of checking the ravages of injurious species, and this leads me to direct attention to the utter lack of all provision of facilities for the carrying on of such work at the Central Experimental Farm.

Last year I referred to the excellent work being done by our Dominion Entomologist Dr. Fletcher, but he is greatly handicapped by the lack of almost every requisite for the efficient prosecution of his work. It is true that since our meeting last year he has been given another assistant in the person of Mr. Arthur Gibson, a director of this Society, but much more than this is needed, and the farm should be equipped with an insectary of the most approved design. and also, I would suggest, with a small cold storage chamber for the successful wintering of pupæ and hibernating larvæ, which might be the subjects of experimentation. There are many such insectaries in the United States, and it is high time that we had at least one in Canada, especially as no great outlay would be necessary, and I would respectfully represent to "the powers that be" that there is no economy in employing a first-class entomologist and not giving him every facility for doing the very best work of which he is capable.

But I must pass on to other subjects, and would invite your attention to a rapid review of some of the more important work being carried on by leading workers in this branch of science.

In Canada, owing to the opposition to the working of the San José Scale law in Ontario, a commission was appointed to inquire as to the extent of infestation, whether it had spread beyond its former limits, whether the destruction of infested trees would check the further spread of the scale, whether it would be possible to exterminate it, whether there was danger of further infestation from scales being carried across the Niagara River, whether opposition to the act was unanimous, how the work of inspection had been performed, the commissioners being invited to make any suggestions they thought desirable as to changes in the mode of procedure, and as to measures for the complete suppression of the pest. The commissioners appointed were Dr. James Mills, President of the Agricultural College at Guelph, chairman, with Mr. John Dearness, ex-President of this Society, and Mr. W. H. Bunting, of St. Catharines. The inquiry was opened on 20th June and closed on 14th July, the Commissioners visiting the counties of Lincoln, Welland, Wentworth, Elgin, Kent and Essex in Ontario, as well as the New York side of the Niagara River and Catawba Island in Ohio, and examining one hundred and sixty-eight witnesses. In regard to the amount of infestation and the extent to which it had been controlled, it was found that the greatest infestation is in one corner of Niagara Township, near Niagara on-the-Lake, and in the Township of Harwich, Kent County, in the neighborhood of Guild's Post-office. There is a limited infestation at Kingsville, and less important ones at St. Catharines, Winona, Burlington and near Chatham. In ninety-one other cases trees planted within the last two years were found infested. These trees were all destroyed, and this year's inspection failed to discover scale in any but thirteen out of the ninety-one places. The scale was found in five nurseries, but the infested stock was destroyed. While the areas of infestation are not large the inspector estimated that it would be necessary to destroy over 150,000 trees to be reasonably sure of exterminating the scale. The inspector thinks that the scale can be exterminated by the prompt and vigorous enforcement of the Act, but the Commissioners incline to the opposite opinion, and they also believe that the damage which the insect is capable of doing in this latitude has been overestimated. They found that, as was to be expected, the owners of orchards were not unanimous in opposition to the Act, for while those whose orchards are not in immediate danger are overwhelmingly in favor of it, those whose orchards are infested or in immediate danger of becoming so oppose it, largely on account of the inadequate compensation allowed for trees which are destroyed, but also because no effort was made to save valuable trees which were only slightly affected, and because the owners had no voice in the determination of the value of the trees destroyed. The Commissioners, while acknowledging the faithful work of the inspector and his assistants, thought that more consideration might have been shown for the feelings of the owners of infested trees and a less offensive method of marking such trees adopted. They advised a continuance of the inspection on modified lines for some time to come but that valuable trees be treated for the purpose of destroying the scale without cutting them down and that owners of trees not so badly infested be required to treat them by a prescribed method once a week from the time of notice till the 15th

October. They also recommended that the compensation for trees destroyed be increased, the owner being allowed twenty-five per cent. of the value including the crop and that he be represented in some way at the valuation. They also recommended that the utmost care be taken to prevent the spread of the scale and that a circular of instructions be prepared and sent to every orchardist in the infested areas and that every owner of an orchard in the Province be encouraged to make a careful inspection of his orchard next winter to discover whether or not there is any San José Scale in it.

In the United States the work in connection with the San José Scale has been largely carried on by the Agricultural Experiment Stations, but the proposed law governing interstate commerce in nursery stock failed to pass the American Congress. An important series of investigations, however, was carried out last autumn at Washington for the purpose of determining whether it is possible for the scale to remain alive upon any fruit dried by any of the methods in use in the United States. This work was aimed especially at the German regulations prohibiting the introduction of American dried fruit into that country. The results of that work as published in Bulletin No. 18, New Series, were very satisfactory as it was fully established that any one of the commercial drying processes is absolute death to the scale insect.

Mr. Marlatt has undertaken a systematic study of the armoured scales (Diaspinæ) and has cleared up many doubtful points of synonymy, the most interesting point, perhaps, which he has brought out being the occurrence of the European Aspidiotus Ostreæformis in the United States where it has existed unrecognized for several years, although late correspondence shows that it is already distributed from New York to the Mississippi River and even to Idaho.

Dr. Howard has had a careful study of the insects injurious to the forest trees of the extreme north western states carried on by Dr. A. D. Hopkins who was employed as a temporary field agent for that purpose. He made a careful study of forest conditions in Northern California, Oregon, Washington and Idaho and found very many new Scolytidæ and has been able to make practical suggestions which will be of value to the lumbermen in that region. This work should also be of value to our lumbermen in British Columbia and the information obtained should certainly be made available to them.

Further work on the study of insects liable to be introduced from abroad has been carried on by Dr. Howard and his assistants. One of the latter was sent to Porto Rico in the spring and made large collections of the injurious insects of that island and further observations are being made. Dr. Howard has been accumulating a large collection of injurious insects of first-class importance from different parts of the world, especially Australia, Japan, Mauritius and Reunion, while the collection of European injurious insects has been greatly added to. The importance of this line of work was strikingly illustrated in an instance which occured in the spring of this year, when an insect boring in the stems of orange received in California from Japan was at once recognized by a comparison with the specimen received some time ago from that country, the habits of which had been previously reported upon.

Late advices show that the importation of Novius Cardinalis into Portugal, which were sent by the Washington office through the courtesy of the State Board of Horticulture of California, was fully as successful as anticipated and all danger from Icerya in the extensive orange groves along the River Tagus is now considered a thing of the past.

Mr. Chittenden has been working mainly on garden and orchard insects and has published his results in Bulletin No 19, New Series, a pamphlet of 99 pages replete with most interesting information.

The usual Western field work on injurious grasshoppers has been carried on and it is claimed that Mr. Hunter, the temporary field agent, has set at rest all rumors in regard to the Turtle Mountains region in North Dakota and Manitoba as a possible permanent breeding ground of Melanoplus Spretus, and it is charged that the occasional swarms which have settled in Dakota and Minnesota have come from the region of the Assiniboine River.

Dr. Howard has published in the year book of the U.S. Department of Agriculture for the year 1898 an important paper on the insects affecting the tobacco plant, which is admirably illustrated by a new series of cuts, and three new pests are treated of But by far the most interesting and important work which has been recently accomplished by Dr. Howard and his assistants is the successful introduction into California of the insect named Blastophaga Grossorum.

Hitherto it has been found impossible to grow in that state any figs which would compare with the Smyrna fig of commerce, which is grown about the eastern end of the Mediterranean Sea. The Smyrna fig tree had been started in California but the flowers were sterile and the figs invariably dropped to the ground before attaining the size of much more than three-quarters of an inch in diameter, but in its native home the flowers are fertilized by this minute insect know as Blastophaga Grossorum, which normally inhabits the flowers of the wild fig commonly known as the caprifig. These figs growing on the mountain side are broken off by the inhabitants and are tied to the branches of the Smyrna figs at the proper season of the year. The insects issuing from the caprifigs and covered with pollen crawl into the Smyrna figs, pollenizing the flowers and bringing about the ripening of the fruit and the production of the seeds upon which the flavour of the Smyrna fig largely depends, and it was decided that the only way in which a fig equal in quality to the Smyrna fig cou'd be grown in California was to introduce the Blastophaga into that state. Private attempts to do this failed and the government was appealed to for aid, and Dr. Howard, after laying the matter before the Secretary of Agriculture, was authorized to make the attempt and succeeding in introducing living specimens of these useful little insects among the Smyrna figs and caprifigs of Fresno, California. The introduction in 1898 was unsuccessful, but this year success crowned the efforts and not only have two generations of the insects developed but many Smyrna figs have been successfully fertilized.

Work is being continued by the Washington Staff on the study on the geographical distribution of injurious insects ; the bibliographical work also continues and it is intended to publish another supplement to the Bibliography of Economic Entomology bringing the list down to January 1900.

That the importance of entomology continues to attract increased attention is shown by the appointment of a state entomologist for Texas. The lamented death of Mr. H. G. Hubbard early in the year interrupted the completion of his elaborate work on insects affecting the citrus trees, and caused a great loss to American entomology. He was an able entomologist, a wonderfully good collector and a truly lovable man.

Last year I had the pleasure of announcing the approaching publication of Dr. W. J. Holland's Butterfly Book. Shortly after our meeting this work was issued and received a hearty welcome from the entomological world, and up to 1st of July last upwards of 3500 copies had been sold, which is certainly remarkably encouraging. Among other important works which have appeared during the year may be mentioned the Monograph of the Species of Acronycta and certain allied general with nine plates of moths, four plates of larvæ and nine plates of structural details, by Drs. John B. Smith and Harrison G. Dyar issued in the proceedings of the United States National Museum, and which is a very important and useful work. About the same time in December last appeared Dr. Henry Skinner's Synonymic Catalogue of the North American Rhopalocera replacing Mr. W. H. Edwards's catalogue of 1884 which had been out of print for some time. This work was much needed and will be of great assistance to lepidopterists. Dr. Dyar's proposed check list to which I referred last year has not yet appeared as the author informs me that he is waiting for Prof. Fernald to complete his revision of the Tortricidæ. Dr. Ottolengui has not yet completed his monograph of the Plusias but expects to issue it during the coming year.

I am glad to say that we are likely soon to have a monograph of the Sesiidæ. The late Henry Edwards who had done much work in this group and had described a very large proportion of the known species contemplated the publication of such a monograph but was not able to do so, but after his lamented death his mantle fell upon Mr. Beuten-

muller who had special facilities for the work in having all Mr. Edwards's types under his care in the American Museum of Natural History, and who has been working upon the group for some years. He has now secured the consent of the Directors of the Museum to the issue of the monograph and it is expected to appear next year. Dr. Packard has been delayed in regard to the publication of the second volume of his monograph of the Bombycine Moths and it will not appear during the coming year. He is waiting to fill up some gaps in the life histories and to obtain good coloured drawings of the larvæ of Platysamia Gloveri, P. Columbia and other forms. The part will include the Ceratocampidæ and Saturniidæ, and any collector who can obtain the eggs or larvæ of P. Columbia would be rendering a service to science by contributing them to aid in the completion of this work. Though not published during the present year attention should be directed to Dr. Packard's Text Book of Entomology, a most important treatise on the anatomy, physiology, embryology, and metamorphoses of insects which has been accorded a very flattering reception not only by the leading entomologists of this continent but also by those of the old world.

Among other publications may be mentioned the pamphlet on the Hessian Fly in the United States prepared by Herbert Osborn and issued as Bulletin No. 16. New Series, of the Division of Entomology at Washington.

Mr. Wm. H. Edwards although retired from active entomological work has not wholly given up his interest in this subject. and recently wrote me that he had urged Mrs. Peart to fill up some of the gaps in his album of drawings of preparatory stages of the butterflies, and said that he wanted to see these drawings deposited in some public institution where they would be available for reference, and it is much to be hoped that this disposition of them will be made. The formation of an Entomological Society in the Canadian North-West Territories is an event of which we should all be glad. It is much to be hoped that the interest which the energetic President has awakened will continue and increase and bear good fruit, and that the Society may become affiliated with us as a branch, and this leads me to the suggestion that it would be an excellent thing if there were more co-operation among the branches of the Society. The Montreal Branch suggested that an interchange of all the more important papers read before the various branches would enable all the members to have the benefit. This suggestion was warmly received by the Toronto Branch, and a few papers were sent up from Montreal, and although the idea has not proved as fruitful as we hoped it would, better results may be, and I trust will be, achieved in the future.

One other event of the past season to which I should refer, was the advent through the medium of the daily press, of a terrible bogey in the form of a bloodthirsty insect which was "written up" by the knights of the quill under the name of the Kissing Bug. It was said that its scientific name was Melanolestes Picipes, and the wildest stories were told of its deadly ravages. Illustrations of it were published, and various kinds of insects of different orders were exhibited in newspapers' windows as genuine specimens of the bug. Quite a number of deaths were attributed to it, and many timid people, especially women, were seriously alarmed. It started from Washington (there is something very suspicious about this, but perhaps our friends of the Division of Entomology can establish an alibi) and spread all over the continent, creating devastation everywhere with the exception, it is said, of Baltimore, whose newspaper men are reported to have been too conscientious to write it up, though the latter statement seems almost more incredible than the stories told of the bug. At last the secret was given away and the kissing bug pronounced a myth, the story having been started as a hot weather silly season hoax.

I have again to acknowledge my indebtedness to Dr. Howard for his kindness in favoring me with much interesting information and valuable suggestions which have been of much service to me in the preparations of this address. And now in laying down the office with which you have honored me, and retiring to the comfortable dignity of a Past President, I desire to thank you most heartily for the honor you have done me in electing me to the highest office in your gift, and especially are my thanks due

to the other officers of the Society for their unfailing courtesy and their readiness to afford me every assistance in their power, and to you, ladies and gentlemen, who are not entomologists, I would say that if you have been dreadfully bored by my address you must pour out the vials of your wrath upon the heads of the Council who arranged that it should be delivered at this meeting instead of being read in the sanctity of the Society's own room.

The Rev. Dr. Fyles expressed the thanks of the meeting to the President for his interesting and valuable address. In the course of a humorous speech, which was much enjoyed by the audience, he stated that when it is borne in mind that at least one-tenth of the vegetable products of the country are annually destroyed by insects, the study of their habits and of the best means of dealing with them is of manifest importance.

Dr. Fletcher gave an address illustrated with lantern pictures, on "Some Interesting Insects." He prefaced his remarks by referring to the statement of the previous speaker regarding the loss caused by insects and said that if there was even a chance of saving some of this ten per cent. loss the study of entomology must be of great economic importance. He considered that a great deal of the destruction of food products by insects is preventable and that entomologists were doing a most valuable work in instructing the community as to what measures were the best to be taken for the purpose. He spoke also of the many points in the life-histories of common insects that still require to be investigated, and of our want of knowledge of the manner in which they lived through the winter. Here was a field that would afford ample employment to every entomologist. Beautiful illustrations of the following and several other insects were thrown upon the screen and their peculiarities or points of interest described by the speaker: The Gipsy Moth (*Ocneria dispar*) which derives its specific name "Dispar" from the great disparity in the sizes of the male and female moth, the latter being nearly double the size of her mate. The state of Massachusetts has been engaged for the last nine years in trying to exterminate this insect and has spent close upon a million dollars in the effort. While the object in view has not been completely accomplished, the insect has been prevented from spreading over the surrounding country and is confined to an area that is gradually becoming more restricted.

The Brown-tail Moth (*Euproctis chrysorrhea*, Linn.) is another importation from Europe in the state of Massachusetts which is proving very destructive. Active measures however are being employed for its extermination in a similar manner to the preceding species.

The Mediterranean Flour-Moth (*Ephestia Kuhniella* Zell) Fig. 1., which has also come to us from Europe, has been found in several mills in Ontario and various parts of the

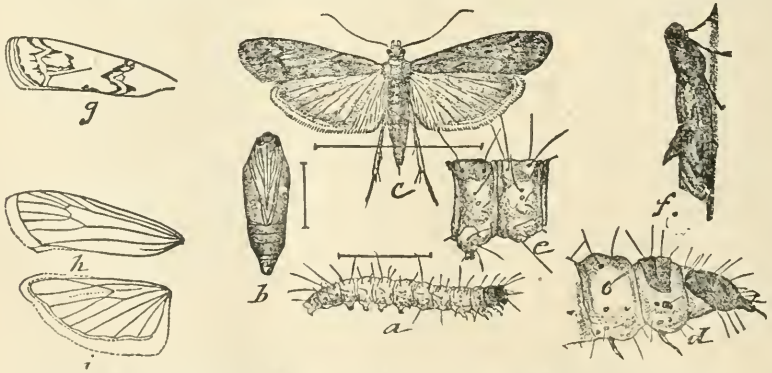


Fig. 1. The Mediterranean Flour-Moth; *a* Caterpillar; *b* Chrysalis; *c* Moth, slightly enlarged; *d* and *e* enlarged details of Caterpillar; *f* side view of Moth; *g* markings on forewing; *h* and *i* venation of wings.

United States. It is a serious pest, as the larva clogs up the bolting cloths with its webs and prevents the flour from sifting through. The moth itself does no damage.

Fig 2. Chinch-bug magnified; the hair line below shows natural size.

The Chinch-bug (*Blissus leucopterus*) Fig. 2, caused a loss in the State of Illinois alone of seventy-three millions of dollars in a single year by its destruction of corn and wheat crops. It is now controlled to a large extent by means of a fungous disease which is disseminated by distributing affected individuals wherever the bug is numerous. Fortunately for us this insect is rarely found in Canada and has never done any harm to our crops.

Fig. 3. Hessian Fly greatly magnified.

The Hessian Fly (*Cecidomyia destructor*, Say) Fig. 3, is doing considerable damage in the wheat fields of Ontario to-day. In some parts of Manitoba it is also doing great injury, destroying from five to twenty per cent. of the crop. There it has only one brood in the year, but here and further south there are two.

Fig. 4. Polyphemus Moth, female, natural size.

The Polyphemus Moth (*Telea polyphemus* Linn) Fig. 4, a very handsome insect, whose larva feeds largely upon elm. The caterpillar eats out a large portion from one side of a leaf, and, when resting, fills the space with its body. The colour matching that of the leaf, and the serrated outline of the creature's back corresponding closely to the original leaf, afford it a remarkable protection against ordinary enemies.

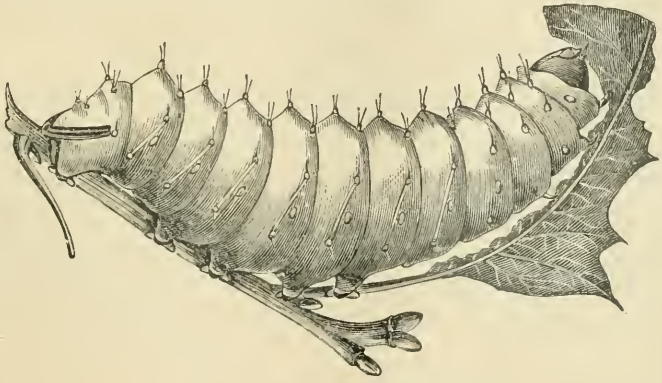


Fig. 5. Polyphemus Caterpillar.

Fig. 6.] Sphinx drupiferarum, natural size.

The Plum Sphinx (*Sphinx drupiferarum*, Sm.-Abb) Fig. 6, whose larva is furnished with a stiff bristly tail, erroneously supposed by ignorant people to be a poisonous sting.

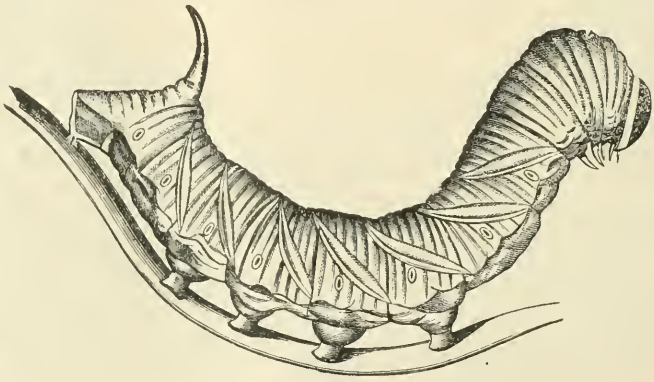


Fig. 7. Sphinx drupiferarum larva.

The Yellow-necked Apple tree Caterpillar (*Datana ministra*, Drury) and several other interesting species of insects were next exhibited and briefly described. The closing picture displayed the extraordinary chrysalis of an African butterfly which bears a striking resemblance to the face of a monkey. The lecturer regretted that he was unable to obtain an illustration for the lantern of a similarly grotesque chrysalis found in this country, that of the well known butterfly *Feniseca Tarquinius*, Fabr., whose larva feeds upon the woolly aphis of the alder.

The following paper was then read by Professor Webster :

ONE HUNDRED YEARS OF AMERICAN ENTOMOLOGY.

By F. M. Webster, Wooster, Ohio.

This is an appropriate year for retrospections; and why not in the science of entomology as well as elsewhere? Why may we not stand on the threshold of a new century as the footman who has made his way over the snow-clad prairies, and, at setting sun, faces about and follows with his eyes the stippled, undulating line of tracks that marks his wanderings over the plain of glistening white? Mayhap, as the wanderer turns again to resume his journey, it will be with renewed vigor and encouragement that will support him in his onward course. And yet the illustration is, in some respects, inapplicable to the case in point, as the entomology of 1899 contains not only all of the knowledge

that is being accumulated in regard to the science at the present time, but all that has come down to us through the past. The results of a piece of entomological work, carried out at the present time, represent not only what the present author has himself accomplished, but the best that has gone before, precisely as the four monster battleships, two Russian and two American, now in course of construction in the Cramp shipyards at Philadelphia, represent not only the triumphs of modern ship building, but the lessons taught by the failures and successes of hundreds of years of ship building. As entomologists we are now working, not alone with our own light, but with our own plus that of all that has been done before us, or so much thereof as has not been eliminated by the siftings of time as the dross is eliminated from the pure metal by the crucible. But for the labors of those who have gone before us, crude though such may now appear, the present status of the science could not now be possible. He that does his best in his day and generation will have little to regret thereafter.

Going back to the beginning of the present century, we find the science ef entomology but little more than in embryo; even in England and Europe, it was still in a very primitive state as compared to the present. Up to about 1775, all information relative to American insects was only obtainable by collections being made in this country, and sent over to England, France or Germany, for determination and description. Thus it came about that original descriptions of many of our species of insects, especially the more common ones, are to be found in foreign publications, and the types of these species are scattered through the collections and museums of England and Europe. In fact, during the latter half of the last century and the beginning of the present, this was the only course possible to pursue, as there were no collections or libraries in this country, and the educational institutions were exclusively classical in their nature. Even so late as 1815, Harvard offered no direct instruction in natural history, except in the lectures of Prof. Peck, and for these an extra fee was charged, while, when Thomas Say went to the Philadelphia Academy of Science, in 1812, he found a company of men had founded it with a view to anything but the advancement of science, and the collections consisted of some half dozen specimens of common insects, a few madrepores and shells, a dried toad and a stuffed monkey. But the facilities for securing entomological material from this country, by foreign entomologists, must have been exceedingly slow and unsatisfactory. A few specimens brought home by a returning traveller, or secured through the hands of captains of ships or from army officers, were probably the channels through which the major portion of the material was obtained. Even the American post was slow and expensive, and it was often necessary for entomologists to wait for months until some friend happened to be going in the right direction, and could be prevailed upon to carry letter and specimens to a fellow worker, The correspondence of all of the early workers in entomology indicates very clearly, how much they were hampered by these deficient methods of communication. Even so late as 1831, Dr. T. W. Harris wrote as follows, in some remarks appended to his catalogue of the insects of Massachusetts: "Should any young sons of New England have the inclination to turn their attention to this interesting branch of natural history they must for want of neceessary books on the subject remain in ignorance of the labors of their European contemporaries; and although they may have discovered many curious and valuable facts respecting our insects, they must resign to foreigners the honor of making known the objects of their investigations."

In view of the foregoing, then, it is not surprising that the close of the last century should have found so little accomplished in entomological research in America, and that except for an occasional fragmentary paper published in some local journal, or at best in the transactions of some semi-scientific body, there had been but two contributions to the knowledge of American insects and one of these was published in England, being entitled to consideration here because of its relating wholly to American insects. The first of these was entitled "Natural History of the Slug-worm," a pamphlet printed in Boston in 1790 and written by Professor Peck, and for which the author was awarded a premium of $50.00 and a gold medal by the Massachusetts Agricultural Society. The second was published in England in 1797 and was entitled "The Natural History of the Rarer Lepidopterous insects of Georgia," by J. Abbot and Sir J. E. Smith and comprised two folio volumes with 105 colored plates.

Thus it will be seen that, whatever collections had been made in America, these were in foreign hands, and the descriptions published in foreign literature, and it was under these conditions that the present century found the science of entomology. But, two events had transpired which, though giving no indication of their future effect, were to start the science, both pure and applied, in that forward movement that has resulted in its present condition.

On July 27th, 1787, there was born in Philadelphia, to Benjamin Say and wife, a son, who was afterwards named Thomas. On November 12th, 1795, in Dorchester, Massachusetts, there was born to Thaddeus Mason Harris and wife, a son, who was afterwards named Thaddeus William. The first of these was the son of a Quaker physician and apothecary, and the other the son of a Congregational minister. With these two lads, who at that time gave little indication of their future greatness, and the state of affairs that I have indicated in the foregoing, began what might well be termed the first century of American entomology.

Ere the present century had been ushered in, there had been serious depredations of insects, and now, with the establishment of an agricultural press there came communications and discussions regarding the nature of the insects implicated in these ravages. These contributions came from both the north and the south, and westward from beyond the Allegheny Mountains, but there was none to throw scientific light upon any of the problems involved. No one to identify the species of insects that were engaged in depredations, or to furnish the information that would enable the people to understand their habits, or to determine whether there were one or several kinds engaged in the work of destruction. There was chaos. Who was there that would from out of this bring system and order?

The boy, Thomas Say, had proved an indifferent pupil; had been taken from school and placed in his father's shop; then started in business and ended in bankruptcy. From boyhood he had taken the greatest delight in collecting insects and he now turned his back as it were on business and began the work that was to make his name familiar throughout the world where natural science was studied, and give him the well-earned title of "The Father of American Entomology." About 1817 he began to publish the results of his studies and continued up to the time of his death in 1834. Though his work was incomplete and has been in some cases criticised for its want of accuracy, yet it was the foundation of the technical branch of the science in America.

The boy Thaddeus W. Harris, on the contrary, seems to have been studious but not at all inclined towards natural science. While at Harvard, from 1811 to 1815, he seems to have developed a taste for entomology which appears to have been stimulated by his friend and instructor, Professor Peck. It is interesting to note that his studies, even at an early date, began to take a somewhat different course from those of Thomas Say in that he became interested in the habits of the insects which he studied. He began to collect insects as early as 1820 and, as he tells us, soon became impressed with the great need of a manual of American entomology. This was doubtless the primitive idea that later led up to his work that has become classical, viz., his "Insects Injurious to Vegetation;" published in 1841 and reprinted in 1842, and again in a revised form in 1852. Though this embodied the results of long years of patient labor under the most discouraging circumstances, the author received from the State for his labor the munificent sum of $175.00. This work was to the applied science what Say's American Entomology was to the pure, viz., the foundation; and if Thomas Say was the "Father of Technical Entomology," then T. W. Harris is fully entitled to the honor of being called the "Father of Applied Entomology" in America. To these two men we owe the inspiration that has induced many an entomologist to commence his studies and encouraged him and sustained him in his later work. They were the pioneers of that period extending from 1800 to the death of Say in 1834, and and in the case of Harris this period continued up to 1855, his last paper on the Rose Bug (*Macrodactylus subspinosus*) appearing in the Boston Cultivator on September 8 of that year. It was Dr. Asa Gray, I believe, that wrote of Harris: "Of other genuine naturalists I have read but he is the only one I ever saw."

While Thomas Say has come to be honored by the title of "Father of American Entomology," he had already himself bestowed that or a similar title upon Rev. F. V. Melsheimer, and in his "American Entomology" he calls him the "parent of entomology in this country." In 1806, so far as I am able to determine, Rev. F. V. Melsheimer published the first general catalogue of North American coleoptera. In 1842 the Entomological Society of Pennsylvania was formed for the purpose of giving an impulse to the study of entomology by bringing together the cultivators of the science and preparing a catalogue of the coleoptera of the country. Owing to the fact that many species of coleoptera had been described in England and Europe, as well as in this country, and many species were to be found in the cabinets of American collectors without names, there was almost utter confusion and it was thought that a catalogue of all described species would, in a measure at least, reduce this chaos to system and facilitate the further study of this interesting order of insects. Accordingly the preparation of this catalogue was assigned to Dr. F. E. Melsheimer, son of Rev. F. V. Melsheimer, author of the first catalogue. This was prepared for publication and afterwards revised and enlarged by Dr. J. L LeConte and S. S. Haldeman, and published in 1853 by the Smithsonian Institution. And from this has evolved our check lists of North American Coleoptera.

After the death of Thomas Say in 1834 several gentlemen took up the work and as there had been several scientific bodies organized, and the publications of these offered facilities for printing the results of their labors, a considerable impulse was offered to the advancement of the science. Among these workers was Maj. LeConte and later his son, Dr. John L LeConte, who afterwards did so much for American coleopterology; Dr. S, S. Haldeman, Professor N. M. Hentz. Dr. Christian Zimmerman and Edward C. Herrick. Among the work of foreign entomologists as related to American species we note especially that of Rev. Wm. Kirby, who was the author of that portion of Sir John Richardson's "Fauna Boreali-Americana" which treats of insects. This contained descriptions of no less than 447 species of Canadian insects, especially coleoptera, and was published in 1837, having since been revised and republished in the "Canadian Entomologist" by Dr. Bethune. In 1840 Mr. P. H. Gosse published in England a list of 26 butterflies, 43 moths and a number of other orders, 14 of which were figured. It was with these advances and in this condition that the beginning of the last half of the present century found the science of entomology in America. There was great confusion in regard to species and this seemed to prevent any rapid progress, both in the pure as well as the applied science, for the latter must always await the advance of the former. As I have stated, the Smithsonian Institution, by the publication of Melsheimer's Catalogue of the Coleoptera, greatly assisted workers in that order of insects but the good work stopped there and it was nearly five years before other orders were similarly treated in the publications of this institution.

The new and beautifully illustrated edition of Harris's Insects Injurious to Vegetation gave this work a renewed value and popularity, especially among the agricultural classes. In 1854 there appeared a series of volumes illustrating the agricultural and natural history of New York. Volume V. of the series was devoted to the more common and injurious species of insects. It is a large quarto volume profusely and brilliantly illustrated, but one for which entomologists have not been able to find any particular use.

In 1855 Dr. Asa Fitch received the appointment of entomologist to the New York State Agricultural Society, the Legislature having made provision for the establishment of the office which was synonymous with that of State Entomologist. The selection of Dr. Fitch was a wise one, and he promptly began to take up the work so well begun in Massachusetts by Dr. Harris, and for fourteen years his annual reports went out not only to aid the farmer to cope with injurious species, but also to aid the more technical entomologist, as a considerable number of the original descriptions of our insects are to be found therein. In 1856 the Canadian Bureau of Agriculture and Statistics offered prizes of £40, £25 and £15 for the best essays, respectively, on the "origin, nature and habits, and the history of the progress from time to time,—and the cause of the progress—of the weevil, Hessian fly, midge and other insects as have made ravages on the wheat crops of Canada; and on such diseases as the wheat crops have been subject to, and on

the best means of evading or guarding against them." The first prize was awarded to Professor H. Y. Hind of Trinity College, Toronto, and his Essay on the Insects and Diseases of Wheat appeared in 1857, being the first publication relating to applied entomology, issued by the Canadian Government. In the meantime, the United States Department of Agriculture had secured the services of Mr. Townend Glover, an Englishman, born in Rio de Janeiro, South America, in 1813, and who, after much wandering about, had finally settled in the United States, about 1836. June 14, 1854, Mr. Glover received his appointment "For Collecting statistics and other information on seeds, fruits and insects in the United States" This was just about the time that the new Bureau of Agriculture was established, and attached to the United States Patent Office, and the Report of the latter for the year 1854 contains the first of a series of reports, on various insects injurious and beneficial to vegetation, though this was the exact title of the first only. The reports for 1854 and 1855 are fully illustrated. In the winter of 1856-57, Mr. Glover was ordered to British Guiana and Venezuela, and there is nothing from him in the Patent Office report for 1856; but in 1857 he again appears, though his articles are also signed by the Chief Clerk, D. J. Brown, by initials only, and this is true of the reports of the Patent Office for the years 1858 and 1859. The entomological paper for the year 1860 was prepared by Mr. P. R. Uhler of Baltimore, Md. Although Mr. Glover was not in evidence in these documents at this time, he was not idle, as will appear later. But the Government had now taken the initiatory step and recognized economic entomology. In the meantime Dr. William LeBaron of Illinois, afterwards State Entomologist of that State, began the publication of contributions on Injurious and Beneficial insects, in the "Prairie Farmer" in 1850, and continued to do so until 1874, two years prior to his death. Miss Margaretta Hare Morris, who began to study the habits of injurious insects in 1841, continued her work and publications up to 1860. Thus it will be seen that the applied science was making rapid strides, not alone as to the study of insects themselves, but in the diffusion of the knowledge gained by these studies, among the horticultural and agricultural masses, and the literature of these industries at this period is even now very interesting to economic entomologists. One can scarcely prepare a paper on many of our common insects without referring back to the volumes of the Prairie Farmer, The Country Gentleman, The Canadian Journal, The Canadian Naturalist and Geologist, and others of that character.

But how about the pure science? Has that branch been allowed to fall behind and the workers therein become discouraged? Though discouraged they probably were, many times, yet there does not appear to have been any lagging behind or giving over to despair. Dr. John L. LeConte did not terminate his labors with the preparation of Melsheimer's Catalogue of the Coleoptera; but the volumes of the Proceedings of the Philadelphia Academy of Science from 1852 to 1865 are filled with his descriptions, and, besides, there were many papers published in the Transactions of the American Philosophical Society, and other similar publications. In 1857, Baron R. Osten Sacken, of the Russian Legation at Washington, having been interested in the Diptera, at the solicitation of the Smithsonian Institution, prepared for publication a Catalogue of the described Diptera of North America, and including the West Indies, Central America and Mexico. In his preface to this Catalogue, which was published by the Smithsonian Institution, in 1858, Baron Osten Sacken expresses the hope that it will encourage the study of the Diptera, as rapidly as Melsheimer's Catalogue of the Coleoptera had furthered the study of that order of insects. In continuation of this work on the Diptera, there appeared, from the same Institution, in 1862, Part I, of the Monographs of the Diptera of North America, by H. Loew, edited, with additions, by Baron Osten Sacken. Part II, of the same series, appeared in 1864; Part III, by Dr. Loew alone, in 1873, and Part IV, by Osten Sacken alone, in 1869. Dr. John G. Morris, an entomologist of Baltimore, had been gathering materials, and in 1860 the Smithsonian Institution published a Catalogue of North American Lepidoptera, and a Synopsis of American Lepidoptera to accompany this, in 1862, though Part I only was published. In 1861, a synopsis of the Neuroptera of North America, by Dr. H. Hagen, LeConte's Coleoptera of Kansas in 1859, his Classification of Coleoptera of North America in 1862, his List of the Coleoptera of North

America, Part I, in 1866, his New Species of North American Coleoptera, in the same year, and Part II of both of these, published in 1873, together with the Catalogue of Orthoptera of North America, by S. H. Scudder in 1868, all printed by the Smithsonian Institution, show an amazing amount of activity among entomologists, during a decade when there was supposed to be little time for science, except that of war. Dr. LeConte himself dropped his studies, and went to the front to care for the sick and wounded, and give to the country his professional services. Dr. Breckenridge Clemens had published his admirable Synopsis of North American Sphingidæ in 1859, in the Journal of the Academy of Sciences of Philadelphia, and also during the same year a paper on the Arctiidæ in the Proceedings of the same institution. Others had published papers in the publications of the American Philosophical Society, the Boston Society of Natural History, and the New York Lyceum of Natural History. The various Explorations and Surveys, carried forward by the United States Government, for various purposes, furnished opportunities for making collections in the newer portions of the country, and the folio volumes dealing with the results of these expeditions are filled with valuable entomological papers.

In 1861 the Entomological Society of Philadelphia began the publication of its proceedings, the Society itself having been chartered in 1862, and six volumes of these were issued prior to 1866, when it was changed to the American Entomological Society, the transactions of which have been published quarterly up to date. In the first series, as above indicated, are found exhaustive papers by all of the most prominent entomologists of the times. In the first volume will be found the name of William Couper, and in the second that of William Saunders, among the contributors. Surely it cannot be said that there was any lack of activity during the fifth and sixth decades of the present century, among technical workers in entomology. But this is by no means all that had been accomplished. In 1862 there appeared, in the *Canadian Naturalist and Geologist*, a list of thirty-six persons, resident of Canada, who were interested in entomology, the list having been prepared by Dr. Bethune and Mr. William Saunders. On September 26th, 1862, ten of the gentlemen, whose names appeared in the above mentioned list, met in Toronto to consider the matter of a definite organization, This, however, was not accomplished until April 16th, 1863, when the Entomological Society of Canada was organized. The September meeting in Toronto was the first meeting of entomologists to be held in Canada, and you will pardon me the disgression if I call attention to the fact that on August 30th, 1889, there was also in Toronto another entomological society born, viz., the Association of Economic Entomologists, a body that was destined to include in its membership, not only every American economic entomologist, but every foreign worker in the applied science. No other society or organization has done so much to bring the workers in the world, in the science of applied entomology, together, in influence and effort, as has this one. No similar organization of the kind exists, and it has been of immense advantage to workers in the applied science in almost every country where entomology is known as a science. To Toronto then, must go the honor of being the birthplace of two of the most important entomological organizations in America. The Canadian Entomological Society, after seven years, was incorporated in 1871, under the name of "The Entomological Society of Ontario," and I esteem it a high honor to be allowed to address you at this its thirty-sixth annual meeting. The Quebec and London branches were established in 1864, and that of Montreal in 1873. In 1864 the newly organized Society published a list of 144 species of Canadian lepidoptera, followed in 1865 by a list of 350 additional species. In 1867, a list of 1231 species of coleoptera was issued, being ten times the number enumerated by Mr. Couper twelve years previously. In August, 1868, was issued the first number of "The Canadian Entomologist." Other similar periodicals have come and gone, with but two exceptions, viz, "Psyche" and "Entomological News," the first of which appeared in 1874, published in Cambridge, Massachusetts, and the second in 1890, and published in Philadelphia, Pennsylvania. Thus, the Canadian Entomologist spans almost one-third of the century of which I am speaking, and its columns have, from the first, been filled with original matter by almost every American entomologist of note living during this entire period. Its pages have

been open alike to the technical and applied science, and the series of volumes constitute a history of entomology in America, during this period. The first editor, Dr. Bethune, had had an eight year's training as entomological editor of the *Canada Farmer*, and was all the more fitted for the difficult task of editing an economic and at the same time technical entomological journal, and the result has been so satisfactory that I do not remember having heard of a single significant criticism being offered against either the publication itself or the nature of its contents. The entomologists of America owe to both Dr. Bethune and Dr. William Saunders a debt of gratitude for their faithful editorial labors. The twenty-nine annual reports of this Society are of great value, though not so free from compiled articles as is the "*Canadian Entomologist.*" In 1865, the Entomological Society of Philadelphia began the publication of the "*Practical Entomologist,*" with Mr. Benjamin D. Walsh, of Rock Island, Illinois, as associate editor at first, and later as editor. The publication was a very useful and valuable one, being, as the title implies, a strictly practical journal, but it was short lived as but two annual volumes were published. In 1868, that exceedingly valuable publication, the *American Entomologist*, was begun under the editorship of Benjamin D. Walsh and C. V. Riley, the former being killed by an accident soon after the close of the first volume. Unfortunately, this too was suspended at the end of the second volume, to be resumed again in 1880, when another volume was issued by Dr. Riley, and then it expired for good. In 1878, the *Bulletin* of the Brooklyn Entomological Society, was started, and six valuable though rather small volumes were published, when this, too, ceased to exist, being, with "*Papilio,*" a magazine devoted exclusively to lepidoptera, and published in New York City, and comprising four volumes extending from 1881 to 1885, merged into "*Entomologica Americana.*" But this last, at the end of the sixth volume, after the fashion of the others, gave up the ghost. There is much that is valuable to be found in all of these publications, and they mark the growth of the science during the period of their existence. Not a few of the younger of our entomologists sent to them their maiden communications though there are no lack of papers by the oldest workers to be found among them. All of these entomological periodicals, including the "*Canadian Entomologist,*" had their influence in encouraging the study of insects especially among young men, in much the same way that the entomologist's contributions to the agricultural and horticultural press have resulted in a closer attention to and a better knowledge of the common destructive insects by our intelligent up-to-date husbandmen.

The activity in the pure science has not been greater than in the applied. Valuable entomological papers by Uhler and S. S. Rathvon are to be found in the reports of the United States Department of Agriculture for 1860, 1861 and 1862, when Mr. Glover was re-employed, this time as Government entomologist, and up to 1878, each annual volume of the Departmental reports contains instructive papers on insects. The author himself derived much aid and encouragement from the paper on "The Food and Habits of Beetles" in the report for 1868. I can only call attention to that other immense work of Mr. Glover, viz., "Manuscript Notes from my Journal, or Illustrations of Insects," with the complete set of illustrations comprising 273 quarto plates, with 6,179 figures engraved on copper. A few institutions in the country have been able to secure a full set of these plates, colored by a competent artist. In 1867, a bill was passed by the Legislature of Illinois authorizing the Governor to appoint a State Entomologist. Through some technicalities he was not appointed, though the Governor recommended Mr. B. D. Walsh for the position; this gentleman would have been made State Entomologist in 1870, but for the terrible accident, on November 12th, 1869, that cost him his life. As it was, he was acting state entomologist at the time of his death, and in that capacity issued his first report. In 1870, Dr. William LeBaron was appointed state entomologist and held the office for four years, issuing in this time four annual reports. In 1875, Dr. LeBaron was followed by Dr. Cyrus Thomas, who held office until 1882, issuing in the meantime, six annual reports, when he was succeeded by Dr. S. A. Forbes, the present incumbent, whose reports contain the results of original work almost exclusively. In 1868 Mr. C. V. Riley was appointed State Entomologist of Missouri, serving in this capacity until 1877, when the office was abolished. The nine annual reports pub-

lished during this period, by Dr. Riley, are classics in American literature of applied entomology. In 1880, Dr. J.A. Lintner was appointed State Entomologist of New York, in place of Dr. Asa Fitch, resigned, and held the office until his death in 1898. While Dr. Lintner could hardly be termed an investigator, his series of carefully compiled reports, relating to the insects to which his attention had been called from time to time, afford a veritable encyclopedia of entomological information, for which more than one worker has felt devoutly thankful. In 1869, Dr. A. S. Packard, who had previously sent out some excellent entomological literature, issued his "Guide to the Study of Insects," the first work of its nature to be issued in America. In 1876, came his big folio volume, "A Monograph of the Geometrid Moths," from the United States Geological Survey, and lately we have had his "Bombycine Moths" and his "Text-book on Entomology," both of which are masterpieces. In 1877, the United States Entomological Commission was organized by an act of Congress, and placed under the authority of the Secretary of the Interior, afterwards being transferred to the Agricultural Department, its members comprising Drs. C. V. Riley, A. S. Packard and Cyrus Thomas. The object in creating this commission was to study the Rocky Mountain locust, but the members did not confine their investigations to these, by any means, and, as a result, we have several bulletins and five octavo reports, the latter containing over 3,200 pages, with 165 full page plates and a great number of smaller illustrations, and 10 large maps. The fifth and last volume was prepared by Dr. Packard, and relates to forest insects exclusively. In 1878 Dr. Riley was appointed United States Entomologist, but held the position for only one year, when he resigned, having in the meantime issued one report. The following year, Prof. J. H. Comstock was appointed to the office which he held three years, issuing two valuable reports and a special report on cotton insects. Since that time Prof. Comstock has given us some most excellent publications. His work on the Coccidæ is known universally among specialists of that group, while his later works "Insect Life" and "Manual for the Study of Insects," have been of great value to students and amateurs. In 1881, Dr. Riley was a second time called to the office of United States Entomologist, serving in that capacity until 1894, organizing a corps of original investigators, the like of which had not before been known in the history of the science. During these years the annual reports, bulletins and the serial "Insect Life" almost constitute in themselves an entomological library. The influence and zest that was thus given to the study of the applied science, and especially in the case of Experiment Station entomologists, can hardly be calculated. On the death of Dr. Riley the office of United States Entomologist very properly and deservedly fell to his long time first assistant, Dr. L. O. Howard, who has not only held the office creditably, but in some respects improved upon his predecessor. At the time of his death Dr. Riley was Honorary Curator of the Department of Insects, in the National Museum of Washington. Dr. Howard also succeeded his superior here, as in the Division of Entomology, but instead of a single aid, as under Dr. Riley, there is now a corps of conscientious, hard-working specialists, whose labors cannot prove other than creditable to American entomology.

In 1888 came the establishment of Experiment Stations, under the Hatch Act, and the office of Station Entomologist has been created in the majority of these institutions, which office is similar to that of State Entomologist, except that, in many cases, the entomologist is called upon to assume the duties of other departments of science, like botany or horticulture, or else devote a larger proportion of his energies to teaching in the Agricultural Colleges. This condition of entomological interests, in the Stations, has necessitated much hurried compilation and attempts towards popularization of old and well-known facts, so that the entomological bulletins of Experiment Stations do not stand as high in the estimation of scientific men as they otherwise would. Nevertheless, this is hardly the fault of the entomologists, but in the management of these institutions themselves, and besides, when we come to sift out the chaff, there remains much in the results of their work that is new and valuable. The workers themselves are too numerous for me to mention here. Theirs is current history, and their works will speak more for them than any words of mine possibly could. In Canada, Dr. Saunders's "Insects Injurious to Fruits," issued in 1883, with a second edition in 1892, has been a wonderful

public educator, in applied entomology, and the working entomologist will find that a copy at his elbow will be of the greatest service. It is one of the very best of its class that has ever gone out from the hand of an American entomologist. In 1887 Dr. James Fletcher was appointed Dominion Entomologist and Botanist and his work has been a herculean one. While he has given out annual reports, we all know full well that these but poorly represent his labor. What can one mind and one pair of hands do in such a sea of work as there is in Canada? It is like attempting to lower Niagara River by dipping the water out of Lake Erie with a teaspoon. You ought to have Dr. Fletcher, and a corps of at least half a dozen well-trained and experienced entomologists, and God speed the day when you may have them.

But I must go back and mention a few others whose work has helped to make American entomology what it is to-day. As long as our Noctuidæ are known and studied, the name of A. R. Grote will be associated therewith, just as will the name of that gray-haired hero (if heroes there be among entomologists, and if not, why should there not be?), William H. Edwards, whose monumental work on the butterflies we may well be proud of, and which, except for Scudder's "Butterflies of the Eastern United States," is unique in our entomological literature. Then there is the work of Clemens, Chambers, French, Fernald and Robinson, as well as others that I have not time to even mention, but who have made their reputations among us. In the Coleoptera there was Dr. Horn, who, either associated with Dr. Le Conte or independently, has done as much or more for American coleopterology than anyone else, although there are others whom I might mention. The life-work of Mr. S. H Scudder is a good example of American activity, as, besides his work on the insects of the present age, he has given the world as well as America such monographs on fossil insects as have never been done before. But time will not allow me to say more, except to mention the industrious labors of Abbé Léon Provancher, and his "Le Naturaliste Canadien," a work that was carried out under discouragements that the most of us cannot appreciate or understand.

In looking back over the field, then, there appear several conspicuous achievements in applied entomology that rise up, like the cloud-capped eminences of huge mountains, from the comparatively level plain. The spraying of fruit trees, bushes and vines to destroy insect pests is an innovation that has saved America millions of dollars annually. The work of the Massachusetts Gypsy Moth Commission is a revelation to those who have never investigated its wonders and merits. The introduction of beneficial insects, both as a means of destroying the destructive ones, and for the purpose of fertilizing the bloom of exotic fruits or plants, is another modern innovation. It will be remembered that, ten years ago, the orange groves of California were threatened with destruction from the Cottony-Cushion Scale, *Icerya Purchasi*, Maskell. After much correspondence with Mr. Frazer S. Crawford, of South Australia, one of the kindliest and most lovable men that it has been my good fortune to meet, and who, except Dr. Riley himself, did more than anyone else to further and bring about the introduction of the natural enemies of the Icerya into California, Mr. Albert Koebele was sent to Australia in order to introduce the insect enemies of this pest into this country. How this was accomplished and the results that were obtained has been told again and again, and covered with glory, not only the United States Department of Agriculture and the State Board of Horticulture of California, but quite properly Mr. Koebele as well. It is, however, but just to say that Mr. Crawford not only was very influential in furnishing the information necessary to the undertaking, but himself forwarded the first *Dipterous* parasites *Lestophonus iceryæ* to this country, and did everything possible to assist the entomologists that afterwards visited South Australia; and for American entomologists to forget for a moment, his connection with the undertaking would be most deplorable. As you know, this introduction of Mr. Koebele's was successful, and similar experiments in sending the *Novius cardinalis* to other countries has also been crowned with success. But another achievement came from the studies of this scale, viz., the application of hydrocyanic acid gas to destroy scale insects. This last honor falls to Mr. D. W. Coquillett, now of the National Museum. Although in a sense forestalled by the introduction of the humble

bee into New Zealand to fertilize the bloom of red clover, *Trifolium pratense*, yet the recent success in introducing and establishing *Blastophaga psenes* into California to fertilize the Smyrna fig adds a well-deserved honor to the office of United States Entomologist at present so creditably filled by Dr. L. O. Howard.

Although important from an educational rather than an economic or technical standpoint, nevertheless I cannot forego calling attention to Dr. W. J. Holland's "Butterfly Book" as paving the way for a better method of presenting the science of entomology to the young or inexperienced. That it should be possible to place such a superb book as this in the hands of our young people, and withal so entertaining, at the price of $3.00, is an innovation in teaching our beloved science.

And now, standing as we do on the threshold of a new century, it does seem as though we might look back over the last with honest pride. From almost nothing we have become the leaders of the world in applied entomology, and we are certainly not exasperatingly far behind in the pure science. International questions of the technical sort have, many of them, yet to be settled, and we may find, after all, that we are not less in error than our fellows in other lands. At any rate, we have accomplished enough to give us the best possible encouragement for future labors, and it is to be hoped that the white-haired veterans that are still with us, and have done so much to make this condition of affairs possible, will live many long years to watch and enjoy our further progress.

As to the future, it seems to me that the work of the entomologist will differ somewhat from that of the past. Except in some groups most of the descriptive work is done, and all that remains is to prove the validity of species, for we have learned one other thing in the past, and that is, that the Almighty can make a better species than the entomologist, though probably nowhere near as many of them. Canada will probably offer a more fruitful field for the collector, for some time to come, than the United States, because it has been less worked, but you also have problems in distribution, variation, development and inter-relations with other organisms, and it is in these directions that I expect to see the science making the greatest progress. If we have a world conquered behind us, there are others in front us to conquer. There is something and enough for everyone to do, and do well. May the Entomological Society of Ontario and its members live long and continue to work faithfully, for the fields are crying out for workers, and the prospects encouraging, and as I have stated before, entomology knows no political lines, but is as boundless as the ocean and as free as the air. So may it ever be.

At the close of Prof. Webster's paper, which was listened to with great attention, another address illustrated with lantern pictures, was given by Prof. Lochhead.

LECTURE ON SOME COMMON INSECTS OF THE ORCHARD, GARDEN AND FARM.

The speaker first dealt with the Scale insects which occur in many orchards, and do a vast amount of harm. The San Jose Scale, the Oyster-shell bark-louse, the Scurfy bark-louse, and the plum Lecanium were each in turn described from the lantern illustrations. The general adoption of spraying with whale-oil soap (2 lbs. to 1 gallon of water) during the dormant season would soon keep the majority of these small scale insects in check. To insure further immunity the speaker advised the use of dilute kerosene emulsion spray during June when the young forms (if any survive) are moving about.

The Codling worm and the Bud worm were next discussed. Their habits and life histories were concisely described, as well as the remedies which were used against them. The insect pests which make webs or tents, viz.: the fall web-worm, and the two species of tent caterpillars, were described, and remedies given, which, if applied properly, would certainly diminish the damage done by these very injurious moths. The use of Paris green spray is recommended while the worms are small, but much might be done by hand-picking the egg-masses of the tent-caterpillars during fall and winter.

The borers, the flat-headed and the round-headed forms could be controlled by the application of a tar wash to the trunks of the trees after many of the worms had been killed by probing the tunnel with a stout wire.

The pea-weevil was described as a very serious pest, for probably one-half of the pea crop of Ontario was destroyed by its ravages. Its life-history was sketched and the carbon-bisulphide remedy was mentioned as probably the most effective.

Among garden insects the Colorado potato beetle, the cabbage-worm, the white grub, and the wireworms were illustrated, and remedies given for their control.

Finally, the speaker dealt somewhat fully upon a few beneficial insects which are too often killed by the farmer and gardener, named, the *lady-birds*, which prey upon plant lice and scale insects, and the *ground beetles* which feed upon grubs in the soil, and even climb trees in search of food. The speaker spoke strongly of the necessity of recognizing the beneficial from the harmful insects, if the best results are to be attained in the warfare against insect pests.

The proceedings were brought to a close by a few remarks from Dr. Bethune, who expressed the thanks of all present to those who had furnished them with such an agreeable and instructive evening. The majority of the audience then visited the Society's room in another part of the building where they were much delighted with the exhibition provided by Mr. Moffat, of many drawers from the Society's cabinets, filled with wonderful and beautiful insects of various orders. The success of the illustrated lectures was largely due to Mr. R. W. Rennie, who fitted up the lantern and manipulated the slides.

THURSDAY, OCTOBER 12th.

The session of the Society was resumed at 10 o'clock a.m., Dr. Fyles occupying the chair at the request of the President. The minutes of last year's meeting were adopted as printed in the annual report. The chairman then called upon the various officers of the Society and its Branches and Sections to read their respective reports upon the transactions of the past year. The first in order was that of the Council, which was read by Dr. Bethune, as follows :

Report of the Council.

The Council of the Entomological Society of Ontario begs to submit its annual report for the year 1898 99.

The thirty-fifth annual meeting was held in Montreal in November last in order that we might join in the celebration of the twenty-fifth anniversary of the Montreal branch. It was well attended by members from a distance as well as by those resident in the city, and the proceedings were of a highly interesting and useful character. A full account has already been published, rendering it unnecessary to enter into details. The branches in Toronto and Quebec are also in a prosperous condition, and have been the means of largely increasing the membership of the Society.

The twenty-ninth annual report on economic and general Entomology was presented to the Minister of Agriculture for Ontario early in February last, and was printed and distributed at the beginning of May. It contained one hundred and twenty pages, and was illustrated with sixty seven wood cuts and two plates, portraits of Messrs. W. H. Harrington and J. Dearness, who have recently held the office of President of the Society. In addition to an account of the proceedings at the last annual meeting the report contains the address of the President, Mr. Henry H. Lyman and the following valuable and interesting papers : "Some economic features of international Entomology" and "The collector and his relation to pure and applied Entomology," by Prof. Webster ; "The farmer's garden and its insect foes," by Rev. Dr. Fyles ; "Entomology in Schools," by Prof. Lochhead ; "The cotton boll worm in Canadian corn" and "Two avian parasites," by Messrs. R.

Elliott and J. Dearness; "A bit of history" and "Random recollections in Natural History," by J. A. Moffat; "The Noctuidæ occuring at Toronto," and "Muskoka as a collecting ground," by Mr. Arthur Gibson; "Notes on Papilio brevicauda," by Mr. A. F. Winn; "The Gypsy Moth," by Mr. E. H. Forbush; "The preparation of specimens for the exhibition of life histories in the cabinet," by Mr. Dwight Brainerd; "The brown-tail Moth" and "Injurious Insects in 1898," by Dr. Fletcher; and "Notes on Insects of the Year," by Messrs, Harrington, Evans, Kilman, Rennie, Hutt and Moffat. In the excellence of the papers and their generally practical character, the volume has well maintained its high standard of usefulness.

The *Canadian Entomologist*, the monthly magazine published by the Society, completed its thirtieth volume in December last. It consisted of 335 pages and was illustrated with six plates and twenty one original wood-cuts; the contributors numbered fifty-three. It was filled with original papers of a high order of merit, and may justly be considered one of the most valuable and interesting volumes since the inauguration of the magazine. Of the thirty-first volume ten numbers have now been issued, containing 304 pages, five plates and thirty-six wood cuts. Among the large number of valuable papers may be mentioned a series of articles on the "Classification of the Entomophilous Wasps," by Mr. William H. Ashmead; and numerous papers on Coccidæ, by Profs. Cockerell, and Tinsley, Messrs. King, Fowler, Parrott and others; a List of Manitoba Moths, by Mr. A. W. Hanham; a continuation of a series of papers by Prof. Wickham, on the Coleoptera of Canada, and Mr. E. M. Walker, on the Acridiidæ of Ontario; life histories of Lepidoptera, by Dr. Dyar; Descriptions of new genera and species in various orders by Messrs. Scudder, Quaintance, Coquillett. Skinner, Smith, Banks and others; and papers on a great variety of subjects of a techincal or practical character by leading Entomologists of America and several distant countries.

The council have learned with much satisfaction that an Entomological Society has been successfully organized in the North-West Territories of Canada, under the presidency of Mr. Percy B. Gregson, of Waghorn, Alberta. They desire to express their heartiest wishes for its success and prosperity and to assure its members of their readiness to co-operate with them in any way in their power. The field is a vast one and its scientific resources are as yet unexplored and almost unknown.

At the meetings of the Association of Economic Entomologists and the American Association for the Advancement of Science, held at Columbus, Ohio, in August last, the Society was represented by Dr. William Saunders, Director of the Experimental Farms of the Dominion.

The Council has watched with interest the vigorous efforts made by the Government of Ontario to prevent the spread of that dread pest of the fruit-grower, the San Jose Scale, and is pleased to learn of the success which has attained the experiments made by Prof. Lochhead in fumigating with hydrocyanic acid gas. It was gratified to learn that one of its members, Mr. J. Dearness, formerly President of the Society, was appointed by the Hon. the Minister of Agriculture, one of the Commissioners for the investigation of the ravages of the Scale in Ontario.

The members of the council are pleased to note the appointment of Mr. Arthur Gibson, President of the Toronto Branch of the Society, to the position of assistant in the Division of Entomology of the Dominion Experimental Farms.

As will be seen from the report of the Librarian and Curator some valuable additions have been made to the collections both of books and specimens.

All of which is respectfully submitted.

HENRY H. LYMAN, President.

REPORT OF THE LIBRARIAN AND CURATOR.

For the Year Ending 31st of August, 1899.

An important addition was made to the library during the past year, by the purchase of some of the more recent works in the various departments of the Natural Sciences, numbering 28 volumes; which will give the members of the different sections associated with the society an opportunity of consulting the latest and best authors in the particular branches of science to which their attention is being directed.

Twenty bound volumes were received from Governments, Public Institutions and Societies during the year.

Of the proceedings and transactions of Societies, Magazines and Pamphlets, there were made up and bound 25 volumes; 1 volume was donated to the library by Mr. Goodburn; making a total of 74 volumes added during the year. The full number on the Register is now 1,627. Books issued to local members numbered 50.

A few specimens of local interest, new to the collection, have been added during the year. An opportunity presented itself of obtaining some Manitoba Lepidoptera, correctly determined, which was secured, and will be—and has already been—of service in identifying other material.

Some interesting additions to the collection of exotics have been made at different times by Mr. C. T. Ramsden of Santiago de Cuba; one of our members at present resident there.

Respectfully submitted,

J. Alston Moffat.

Mr. J. A. Balkwill presented his financial statement as Treasurer of the Society and stated that the balance on hand would all be required to meet the ordinary expenditure during the remainder of the year.

AUDITORS REPORT.

Receipts and expenditures of the Entomological Society of Ontario for the year ending August 31st, 1899.

Receipts.		Expenditures.	
Balance on hand Sept. 1st, 1898	$ 739 25	Pins, Cork, etc	$ 91 04
Members' Fees	390 90	Annual Meeting and Report	285 25
Sales of Pins, Cork, etc	89 23	Library	125 48
Government grant	1000 00	Printing	597 21
Advertising	13 00	Expense Account. (postage, etc.)	108 94
Interest	17 73	Salaries	300 00
Sales of Entomologist	34 11	Rent	200 00
		Balance on hand, August 31st, 1899	576 30
	$ 2284 22		$ 2284 22

We the Auditors of the Entomological Society of Ontario hereby certify, that we have examined the books and vouchers of the Treasurer and find them well kept and correct and the above is a true statement of the accounts of the Society.

London, Sept. 15th, 1899.

W. H. Hamilton, James H. Bowman, } Auditors.

A discussion on the subject of the purchase of a Magic Lantern was introduced by Mr. John Law, who thought that the Society ought to have one for exhibition purposes. Prof. Lochhead gave some information regarding the cost of a lantern and slides. After remarks by Messrs Dearness, Fletcher, Bethune and Bowman, it was resolved that "The consideration of the question of purchasing a Magic Lantern be referred to the library committee to obtain all the information possible about it during the year, and that they be authorized to purchase slides and to rent a lantern at such times as may seem advisable."

The next business of the meeting was the election of officers for the ensuing year, which resulted as on page 2.

Honorary Members.—The following gentlemen were unanimously elected Honorary Members of the Society :—Dr. L. O, Howard, United States Entomologist, Washington, D. C.; Professor John B. Smith, Sc. D., Rutgers College, New Brunswick, N. J.; Professor F. M. Webster, Wooster. Ohio; Professor H. F. Wickham, Iowa City, Iowa.

REPORT OF THE GEOLOGICAL SECTION.

The Geological Section of the Entomological Society of Ontario begs leave to present the following report :

The meetings of the section were held weekly as usual, and a gratifying amount of interest in the study of geological science was evinced.

The noteworthy features of the year's study were the following : (*a*) An examination of local geology, including discussions respecting the origin of the flowing sulphur springs; (*b*) an investigation of the extent of local peat beds; (*c*) visits to Kettle Point; (*d*) visits to Western Ontario oil fields; (*e*) and a very interesting account of a visit to the Parry Sound district. Besides these visits Mr. Percival revisited the Strontium cave at Put-in-Bay Island, Ohio. Mr. Goodburn also visited the Lake Superior copper region, and will report on it.

Local Geology.

London is situated in a wide valley eroded by the river, whose two main branches unite at this point. It is probable that the course of the river has been changed here more than once, and that at one time the north branch flowed east by way of Carling's Creek and joined the east branch on the eastern limits of the city, and that the channel of the east branch is now several hundred feet south of its ancient location. The boulder clay is here deeply overlaid by clean water-washed sand, with quicksand in many places. The distance to bedrock is about 120 feet in the lower parts of the city. On the highlands surrounding it is much more. At Mt. Brydges, 20 miles west, it is 300 feet. Thus the depth of the drift and boulder clay is a feature of the locality. In the eastern part of the city pure water is obtained abundantly in the drift, but lower down than the boulder clay no water suitable for domestic use in quantity has been found until great depths are reached. On the other hand, at the Forks, and generally in the western portion of the city, sulphur springs are found in the upper rock strata. A sulphur spring, flowing 40 cubic feet per minute, struck about thirty years ago, continues to flow in undiminished volume. The water rises to a height of 24 feet above the surface, and formerly was utilized to turn a wheel and made to do useful work at street watering until the sulphuretted hydrogen created a nuisance on the streets and in the shops where iron goods were sold. Analysis of the water shows it to be highly mineralized, and it is reputed to be valuable as a remedy in cases of certain skin diseases, particularly eczema. Facilities for bathing have been provided, and are patronized by the general public. The quantity of sulph. hydrogen is not large, though from its offensive odour it would appear to be exceedingly abundant. The gas probably has its origin in the decomposition of the gypsum beds of the Onondaga group, and coming from higher levels to the eastward flows as before noted. The temperature of the water is 48°, and in summer seems icy cold. It is scarcely possible that it comes from any great depth, as if it did so its temperature would be considerably higher.

Dr. Woolverton, chairman of the Section, revisited Kettle Point and its vicinity during the summer. In addition to the rocks noticed last year he traced an outcrop of Corniferous limestones, distant about two miles from the present shore of Lake Huron and parallel to it. A species of large spirifer (*Spirifer increbescens*) was abundant. The specimens collected were much larger than *S. mucronatus*, abundant near Thedford. The rocks are lower than those of Thedford and Arkona. They form an old shore line, and between them and the lake are extensive sand dunes. Economically they furnish a coarse lime for rough building purposes, but contain too much iron for use in buildings of the better class. An old Indian trail crosses this lime bed. The Indians throughout Lambton County have a general tradition that a silver lead mine exists somewhere in the vicinity. Among other places No. 4 hill in Bosanquet, three miles from Arkona, is pointed as the location of the mine, but the Doctor was unable to find any trace of it. Another locality pointed out is a bluff on Black Creek, near Oil Springs, where it is said the Indians formerly made their own bullets. Like the Indian idea that a seam of coal exists under water at Kettle Point, the notion that a galena vein exists in Lambton is not generally believed.

Strontium Caves.

Mr. Percival paid a second visit to the Strontium sulphate cave at Put-in-Bay Island. Another cave of large size, named Dossard's, has been discovered on an adjoining lot. It contains some crystals of Strontium, and has stalactities and stalagmities. It is in the form of a crescent, and is said to be 700 feet in length. Like Perry's cave in the same vicinity, it is in limestone rock.

Peat Beds.

A number of the members of the section visited a peat bed, situated about 3 miles west of London at Redmond's farm. It lies in a low spot bordered by high hills on the east and north. Towards the south a barrier not more than a few feet in height isolates it from the River Thames. In the centre is a pond of clear spring water over 60 feet in depth. This spring is capable of furnishing one million gallons per day of excellent water, and as it is only about $\frac{3}{4}$ mile from Springbank it will probably in time become valuable. This water finds its way through gravel beds into the river. The surface of the pond is 109 feet above the river. Around the margin of the bed is a tangled growth of firs, willows or other shrubs. Farther in are cranberry and other low bushes, while thickly covering every available spot is a feathery moss called Sphagnum, with occasionally pitcher and other aquatic plants. This peat bed covers about 48 acres, and is quite deep over most of the surface. A depth of 60 feet has been measured during the winter season when the pond is frozen over. Members of our Section measured it where practicable, and found from 8 to 20 feet of good peat in its outer zone. Mr. Kirk and others have tested its quality as a fuel, and have found it to be of a high standard. Some of it is remarkably dense for peat, and when air-dried for a few days it requires considerable force to break it. The specific gravity of one sample was but little below 1, which is about four times as dense as peat usually is. It is easily kindled, burns with a bright flame, gives off great heat, and burns almost entirely away. Only an insignificant amount of ash remains. The ash is light and flaky, and is entirely free from slag or clinkers.

As Ontario possesses at a moderate estimate 1,000,000 acres of peat, the economic value of this hitherto neglected fuel is very apparent. It will soon be appreciated on this continent as it has been for so long in the Old World. Coal contains from 1 to $1\frac{1}{2}$ per cent. of sulphur, and this forty to sixty pounds of sulphur per ton has a most damaging effect on the iron smelted by its agency. Peat contains no sulphur, and is to be used in our new iron furnaces at Orillia. For domestic use it is soon to be put on the market at Stratford and elsewhere. A company is now being formed to develop our local beds. Sphagnum is the best material for paper-making, and a cloth for making antiseptic bandages is being now made from it. For steam raising peat is an ideal fuel, filling the firebox with flame, while it is without the disadvantage of the sulphur which corrodes the firebox and tubes of the boiler. Being almost smokeless it would be most welcome as a domestic fuel, and for factory use. When destructively distilled peat yields besides vari-

ous useful compounds obtained from coal, about 10,000 cubic feet of gas. Peat gas is more easily purified than gas made from coal, and it leaves no vile-smelling lime compounds to be got rid of as is the case with coal. About 100,000 cubic feet of water gas can be obtained from one ton of peat, and this gas without enriching can now be used for lighting through the discovery of the incandescent mantle. As a fuel gas it would be very cheap and of great heating power, as it is largely composed of hydrogen, whose heating capacity is more than four times that of an equal weight of coal gas. For heating it would be nearly as cheap as natural gas, and next in convenience and cleanliness to electricity, used for that purpose, and at a hundredth part of the cost of the latter.

Other peat beds are known to exist in the neighborhood. A majority of the members of the section paid visits to the peat beds among whom may be mentioned Dr. Woolverton, Mr. Percival, Mr. Sangster and Mr. Kirk.

Oil Wells.

Dr. Woolverton reported on the developments in the Dutton oil district. During the year several wells, producing at first 25 bbl. a day, were struck. The production diminished in a short time to 1 to 2 bbl. The Standard Oil Company is actively developing in that district.

Mr. Kirk visited the Sarnia oil district where the Standard Co'y is also developing a new oil territory. A well which produced 40 bbl. a day was struck there during the month of July last. It continued to produce at that rate for about 3 weeks after which it gradually fell off to about 10 bbl. a day. The average production of the wells in the Sarnia district is about 1 barrel a day.

Parry Sound District.

Dr. Woolverton spent several weeks in the Parry Sound district and made a most interesting report on its rock formations., characteristic minerals and its prospects as a mining region. 'The Huronian rocks,' he said, 'are much disturbed throughout the whole region, and dip in every direction, while intrusive rocks are very common. Most of the surface rocks were metamorphic, the capping being usually gneiss. The boulder-strewn surface is covered with a dense carpet of lichens. Among other samples collected here are marbles, pure quartz of various shades from white to quite dark, jasper conglomerates, mica, Bornite, Chalcopyrite and Copper pyrites. These garnets were obtained from Parry Harbor. The mica specimens, of excellent colour and of merchantable size, are found about seven miles from Parry Sound. A strongly mineralized zone extends from Parry Sound to the Muskoka lakes, a distance of about 20 miles south east, while far to the north the region is well mineralized. A number of companies with sufficient capital are actively pushing the development of copper prospects and properties have changed hands at high prices. Mention may be made of the development work being done by The McGown Mining Co., The Wilcox Co'y., The Le Fex Co'y., The Parry Sound Co'y., C. Copper Co'y. and The Bornite, the latter being a local concern. Not much nickel has yet been found. The Bornite is found in rich pockets. A sample lot of six carloads netted the owners about $5000. Copper pyrites is extensively found and is quite rich in copper.'

S. Woolverton, Chairman.

REPORT OF THE MICROSCOPICAL SECTION.

The section was organized on Oct. 22, 1898, with the following officers:—J. A. Balkwill, Chairman; S. Silcox, Secretary, J. H. Bowman and W. H. Rennie, committee.

Eight meetings were held during the winter, beginning Nov. 12th and on each 2nd and 4th Saturday thereafter. At several of these the subject of Ecology was taken up, following notes obtained at Chicago University by W. T. McClement, M. A. of the

Armour Institute, Chicago. Many interesting sections of plants from various sources, microscopical plants and organic salts were presented for examination at the meetings.

Papers were read on the Agaricinae by J. H. Bowman; Starch by J. Dearness; microscopical examination of crystals by J. H. Bowman, and these papers were reviewed: "Staining Algae" by J Chamberlain, Chicago; "Histology of plants in relation to their environment" by W. T. McClement, Chicago.

J. A. Balkwill, Chairman.

S. Silcox, Secretary.

REPORT OF THE MONTREAL BRANCH.

The 216th* regular and 26th annual meeting of the Montreal Branch of the Entomological Society of Ontario was held at 74 McTavish St. on 9th May, 1899.

The members present comprised Messrs. Henry H. Lyman (President), A. F. Winn (Vice-President), Dwight Brainerd, J. B. Williams, A. E. Norris, M. W. Davis, Rev. W. A. Fyles, G. A. Moore, G. Chagnon, and L. Gibb; visitor Rev. E. C. Trenholme.

The chair was taken by the President and the minutes of the previous meeting were read and confirmed and the minutes of the last annual meeting were also read.

The President then submitted the following report of the Council for the past year:

Report of the Council.

In presenting their twenty-sixth annual report the Council have much pleasure in referring to the fact that the season just closing has been the most memorable in the history of the Branch, owing to the highly successful celebration of the 25th anniversary of its formation, which was held on the 8th of November.

Special mention should also be made of the holding, in connection therewith, of the annual meeting of the parent society which gave our members an opportunity of meeting such pioneers in Canadian Entomology as Dr. Bethune and Dr. Saunders and of taking part, as members, in an annual meeting of the parent society.

Since our last annual meeting three new members have been added to our roll, one being transferred from the parent society. During the year eight meetings have been held, at one of which we had the pleasure of the attendance of Rev. Dr. Fyles and at another of Dr. Fletcher, and the following papers were read and addresses given:—

Annual address of the President, H. H. Lyman.

Notes on ovoposition of a clothes moth when in a dying condition, E. T. Chambers.

Life history of Xylina Bethunei, H. H. Lyman.

Notes on collecting in British Columbia, D. Brainerd.

On arranging Lepidoptera to illustrate family groups, J. B. Williams.

The early days of the Montreal Branch, sent by Mrs. A. L. Jack.

Notes on a few moths, H. H. Lyman.

The basket worm, Thyridopteryx Ephemeræformis, A. F. Winn.

Observations on the emergence of the imago of Papilio Brevicauda, A. F. Winn.

Notes on the Genus Grapta, H. H. Lyman.

Address on his ascent of Mt. Cheam, Dr. James Fletcher.

Address on the Medico legal aspects of entomology, Dr. Wyatt Johnston.

*Last year's annual meeting was supposed to be the the 215th, but it was found that in 1889 a mistake had been made in the count which has now been corrected.

On the protection of Lepidoptera from mites and other pests, A. E. Norris.

Notes on Danais Archippus, H. H. Lyman.

The President also attended a meeting of the Toronto Branch and read a paper before it. The annual course of half-hour lectures to young people at the Natural History Society again received the assistance of several of our members.

The average attendance at the meetings has been a fraction over 10, being the highest average in the history of the Branch.

The Treasurer's report shows that the finances of the Branch are in a satisfactory condition, and the Council would suggest that some provision be now made for the care of such books as the Branch possesses, that they may be readily available for the use of the members.

A number of our members took part in the annual field day of the Natural History Society at Rigaud, on 4th June, and another field excursion was made to St. Rose and St. Therese on the 1st July, in which four of our members participated.

Respectfully submitted on behalf of the Council.

HENRY H. LYMAN.
President.

The Treasurer then submitted his report, which showed an accumulated balance in hand of $45.26.

Upon the motion of Mr. M. W, Davis, seconded by Mr. A. E. Norris, the reports of the Council and Treasurer were received and adopted.

The President then read his annual address, making it his valedictory upon retiring from the presidency, reviewing the past history of the Branch, and giving many interesting details of the early years.

A vote of thanks to the President for his address was carried, and the Secretary was instructed to copy the address in full in the minutes.

The following officers were then elected for the ensuing year :

President, Albert F. Winn ; Vice-President, Dwight Brainerd ; Secretary-Treasurer, Lachlan Gibb ; Council, Henry H. Lyman, G. C. Dunlop, A. E. Norris,

The retiring President then vacated the chair, which was taken by the new President, who read an interesting paper on " Collecting at Electric Light."

After discussion and the examination of specimens brought by the members the meeting adjourned.

LACHLAN GIBB,
Secretary-Treasurer.

REPORT OF THE TORONTO BRANCH.

The third annual meeting of the Toronto Branch of the Entomological Society of Ontario was held in the Education Department (Normal School) on Friday evening, the 7th April, 1899.

The following members were present: Messrs. Cherry, Stewart, Walker, Fenwick, Wilby, Austen, Kinghorn, Gibson (Secy.-Treas.), Carter and Tyers ; visitor: Mr. Wm. Watkins.

In the absence of the President and Vice-President, the Secretary was requested to act as Chairman.

The minutes of the previous regular meeting were read and approved.

The Secretary read the following report of the Council for the year ending 31st March, 1899 :

Report of Council.

The Council of the Toronto Branch of the Entomological Society of Ontario take pleasure in presenting the third annual report of the proceedings of the Branch for the year ending 31st March, 1899.

They have much gratification in stating that, since the last annual meeting, four new names have been added to the roll of membership, viz., Messrs. E. M. Walker, G. M. Stewart, Allan Kinghorn and Donald Wilby, and the hope is expressed that all the members will endeavor to obtain other new additions in the near future.

During the past year twenty regular meetings have been held, the following papers being contributed from time to time:

"Relations existing between plants and insects," by Mr. S. R. Carter.

"Muskoka as a collecting ground," by Mr. A. Gibson.

"Notes on the collection and preservation of Botanical specimens," by Mr. S. R. Carter.

"The life history of Xylina Bethunei," by Mr. H. H. Lyman, of Montreal.

"The evolution of the insect," by Mr. E. M. Walker.

"What value is to be derived from a study of Entomology?" by Mr. A. Gibson.

"Head appendages of the Orthoptera," by Mr. G. M. Stewart.

During the collecting season three field days were held, viz., on the 24th May to Silver Creek, on the 11th June to High Park, and on the 18th July to High Park.

In December last, certain of the members being interested in plant life, the suggestion was made that a Botanical Section be formed, and the following motion was made by Mr. Carter, seconded by Mr. Walker, and duly carried: "That in view of certain members of the Society being interested in the study of Botany, a section be formed with the object of encouraging this branch of Natural Science, with the hope of securing new additions to the roll of membership, and also in view of the close relationship existing between the entomologist and the botanist, particularly from the entomological standpoint."

The report of the Librarian-Curator shows that the library and collection of insects is steadily increasing. Quite a large number of Government publications and other valuable books have been added to the library during the year.

The Treasurer's report shows a satisfactory balance on hand of $9.43.

All of which is respectfully submitted.

R. J. Crew,
President

The report of the Treasurer was presented as also that of the Librarian-Curator, submitted by Mr. Gibson. On motion of Mr. Austen, seconded by Mr. Cherry, the reports of the Council, Treasurer and Librarian-Curator were adopted as read.

The election of officers for the ensuing year resulted as follows: President, Mr. Arthur Gibson; Vice-President, Mr. E. M. Walker; Sec'y-Treas., Mr. G. M. Stewart; Librarian, Mr. H. O. Austen; Members of Council, Messrs. R. J. Crew and S. R. Carter.

In the absence of the President the Secretary then read Mr. Crew's address, which was listened to with much interest and which contained many valuable suggestions. He mentioned that it was gratifying to know that the branch had enrolled four new members during the year, which strengthened it a good deal and hoped the members would encourage others to join and take an interest in the work. Among other things Mr. Crew suggested that during the following winter certain of the meetings be set aside for certain subjects, all the members bringing as much information as they can about these subjects to the meeting in order that all may take part in the discussion and get the full

benefit of the remarks. In this way he thought much interesting work could be accomplished. And if certain evenings were also set aside for dissecting and studying the anatomy of certain insects much useful information would thus be available. He also touched upon the newly formed Botanical Section, which as yet has not taken much shape, but the hope was expressed that other botanists might be induced to become members and thereby strengthen the branch. Mr. Crew, in conclusion, thanked the members for the honor they conferred upon him in electing him as their President for the year just closed.

The meeting then adjourned.

ARTHUR GIBSON,
Secretary.

REPORT OF THE QUEBEC BRANCH.

The annual meeting of the Quebec Branch of the Entomological Society of Ontario was held on the 15th April, 1899, fourteen members being present; the President, Rev. Dr. Fyles, occupying the chair.

PRESIDENT'S REPORT.

The Quebec Branch of the Entomological Society has commenced the third year of its existence. It was formed on the 24th March, 1897, and the time since has been marked by steady growth and increased usefulness.

The annual meeting of 1898 was held at the house of the Secretary-Treasurer of the Association and was a happy and successful gathering. During the year following three very pleasant meetings were held at the homes of members: Mr. Thos. Poston, Levis; Mr. J. E. Treffry, Quebec; Mr. James Geggie, Beauport, and seven were held at Morrin College.

Field days were also pleasantly spent at Bergerville (June 5th), the Island (June 18th and August 4th), and at Levis Forts (July 21st). On these occasions many interesting captures of insects were made and much information concerning them imparted.

In the course of the year papers were read or addresses given on the following subjects:

The destruction of the forests, the Apidae, the Coleoptera, Garden Pests, Silk-worm moths, Arsenical spraying and Honey Bees, the Book of Nature, Spiders, Crickets, Wasps.

At one of the meetings beautifully illustrated Entomological works were exhibited by Miss Bowen, and a most interesting history of the Entomological Society of Ontario, written by Rev. Dr. Bethune, one of the founders of that society, was read by Miss Palmer, B.A.

The captures made during the year included the rarities: *Catocala bianca*, *Platarctia parthenos*, *Spilosoma congrua*, *Lophopteryx elegans*, besides several undescribed species.

Of destructive pests, the only noteworthy appearances in this Province in 1898 were those of the Tent Caterpillars, *Clisiocampa Americana* and *Clisiocampa disstria*. These were so numerous last summer in parts of the counties of Drummond and Shefford that they stripped the second growth trees bare. Should the coming season prove favorable to their increase they will probably do much harm. A forked stick thrust into the webs in the early morning or late in the evening when the caterpillars are "at home", and twisted round, will entangle the creatures in their habitations, which can then be drawn from the tree and trodden under foot.

On the 8th of November, the Montreal Branch celebrated its 25th anniversary, in the Natural History Society's Rooms, University Street. On this occasion eminent entomologists from London, Toronto, Ottawa and and other places were present. The Quebec Association was represented by its president, who was specially deputed by its members to convey their congratulations to their Montreal *confreres*.

It is gratifying to see the spread of interest in Entomological pursuits. The past year has been marked by the formation of "The North West Entomological Society." It numbers among its members the Right Reverend the Bishop of Calgary and Saskatchewan; John A. Simpson, M.L.A; A. G Wolly Dod, Esq, Secretary of the Fish Creek Agricultural Society; Dr. H. George, Vice-President of the Innisfail Agricultural Society; Wm. Posthill, Esq., J.P., Vice-President of the Red Deer Agricultural Society; John Y. Young, Esq., editor of the "Calgary Herald". The membership of this society exceeds forty already.

It is to be hoped that our own association will continue to flourish and will spread information concerning our insect friends and insect foes, and the right method of dealing with both. One of our leading botanists, while seeking to advance agricultural interests. truly said: "A good knowledge of Entomology is good for the farmer—*There is money in it.*"

Report of Council.

Your Council has pride in producing this report for the approval of the branch as we have nothing but pleasure to note as to its working.

The branch now includes forty-two members; 28 adults and 14 juniors. The Treasurer's report gives a most satisfactory showing.

Several excursions were made, and the capture of many specimens—some of them rare—has rewarded the efforts of the members. As was remarked in a former report these excursions tend to bring about a good feeling of comradeship and are beneficial in every way. The younger members of our branch have been extremely keen in hunting for and acquiring specimens and their efforts have been highly successful.

The largely increasing membership affords much reason for congratulation.

Our thanks are due to the authorities of Morrin College for their kindness in placing a room at the disposal of the branch for its meetings.

Joseph Eveleigh Treffry,
on behalf of the Council.

The following officers were elected:

President, Rev. Thomas W. Fyles, D. C. L.; *Vice-President*, Miss Macdonald; *Council*, Hon. Richard Turner, Mr. J. Eveleigh Treffry, Prof. H. Walters, Mrs. R. Turner, Miss Bickell, Miss B. Winfield; *Secretary-Treasurer*, Lt. Col. Crawford Lindsay; *Curator*, Prof. H. Walters.

Since the annual meeting in April the Branch has held four regular meetings and four field days.

The Branch now numbers thirty-two adults and fifteen junior members.

Crawford Lindsay,
Secretary-Treasurer.

Quebec, October 7th, 1899.

REPORT FROM THE ENTOMOLOGICAL SOCIETY FO ONTARIO TO THE ROYAL SOCIETY OF CANADA.

By Rev. Thomas W. Fyles, D.C.L., F.L.S., Delegate.

The Entomological Society of Ontario held its 35th annual meeting in Montreal on the 8th and 9th days of November last. The Society is gaining ground—is lengthening its cords and strengthening its stakes, or, to use another figure, is rooting itself more firmly in public estimation, while its ramifications are vigorous and fruitful.

Originated in 1863, through the efforts of a very few earnest men, who were impressed with a sense of the practical value of Entomological pursuits, the Society has

steadily progressed till it has attained a degree of importance that insures for it the respect of scientific men "all the wide world over." Its publications are now circulated in 22 countries, in the four quarters of the world. On this continent, not only are they distributed throughout our own dominion, they are sent also to no less than 40 of the states and territories of the great Republic to the south of us.

At 429 Wellington Street, London, Ont., the Society has its headquarters—a large, convenient and well appointed room, with a valuable library of 1,600 volumes, and cabinets containing many thousands of choice specimens, contributed by its members or obtained by purchase or donation. Among its treasures are special collections, such as the Pettit collection of Coleoptera, the Loomis collection of Japanese butterflies, the Moffat collection of Canadian Lepidoptera, acquisitions gained through years of research by skilful, scientific men.

The Society's librarian and curator is Mr. J. Alston Moffat, a man devoted to his work, well acquainted with the objects under his care, and most kind and obliging to those who seek information from him. The room is open at all convenient hours; and an examination of its contents will well repay the naturalist who will take the time to visit it.

The various sections of the Society are working zealously. The Botanical section reports the discovery of three plants new to the district of London. It also draws attention to a species of wild lettuce (*Lactuca scævola*) that is rapidly spreading, and becoming troublesome to the agriculturists of Middlesex County, and to a species of dodder (*Cuscuta epithymum*) that flourishes upon clover. The Microscopical section has held 9 meetings in the course of the year. Papers on "Shine Moulds," Bacteria, Radiolaria, Diatoms, and Marine Algae, were read before it. The Geological section met weekly throughout the year. Its report describes the bituminous shales of Kettle Point, the "Crystal Cave" at Put-in-Bay, and the strontium found in it. The Alvinston shales; the dolomite rocks at Galt, and the new oil-field in Sarnia Township.

Notes on the "Insects of the Year" have been sent in by the Society's divisional directors:—Messrs. W. Hague Harrington, Ottawa; J. D. Evans, Trenton; Arthur Gibson, Toronto; A. H. Kilman, Ridgway; R. W. Rennie, London. These notes appear in the Society's annual report.

Flourishing branches of the Society exist in Toronto, Montreal, and Quebec. That of Montreal is particularly deserving of notice, forasmuch as it has recently celebrated the 25th anniversary of its formation. To do honor to the occasion the parent society held its annual meeting in Montreal, and the Natural History Society and the Microscopical Society of that city gave their aid and support. The proceedings were of a most interesting and enjoyable character.

The Society's monthly organ, "The Canadian Entomologist," completed its 30th volume in December last. In this volume articles from 53 contributors may be found. Some of the authors wrote from such distant places as Cape Town, Africa; Hildesheim, Germany; Mesilla, New Mexico; Massett, Queen Charlotte Islands. The volume contains, amongst other important matter, descriptions of 35 new genera, and 190 new species of insects, and it is illustrated with six plates, one of which is beautifully coloured. Among the more important articles are:—

A generic revision of the Lachneidæ, by Harrison G. Dyar, Washington, D.C.

On the history and habits of the "Wood Engraver" Ambrosia Beetle, by A. D. Hopkins, Entomologist, West Virginia Agricultural Station.

The Coleoptera of Canada, by H. F. Wickham, Iowa City.

"New and little known bees," by T. D. A. Cockerell, N. M. Experiment Station.

"Some Indiana Acridiidæ," by W. S. Blatchley, Indianapolis, Ind.

"New species of Chionaspis, and notes on previously known species," by R. A. Cooley, B. S., Amherst, Mass.

"New species of North American Myrmelionidæ," by Rolla P. Currie, Washington, D. C.

"Metallic species of Basilodes and new species of allied genera," by R. Ottolengui, New York.

"Descriptions of new genera and species of the Geometrina of North America," by Geo. D. Hulst, Brooklyn, New York.

"Notes on some Ontario Acridiidæ," by E. M. Walker, Toronto.

"Classification of the Horntails and Saw-flies, or the sub-order Phytophaga," by William H. Ashmead, assistant curator Dep. of Insects, U. S. National Museum.

"Additions to my Synopsis of the Tachinidæ," by D. W. Coquillett, Washington, D. C.

The twenty-ninth annual report of the Society "(published by the Ontario Department of Agriculture, Toronto), printed by order of the Legislative Assembly of Ontario," has just been issued. It is embellished with portraits of William Hague Harrington, F. R. S. C., president of the Entomological Society of Ontario, 1893–5, and John Dearness, I. P. S., president of the Entomological Society of Ontario, 1895–7, and also with 67 figures of insects. It contains a full account of the annual meeting, reports from the officers and the various divisions and branches of the Society, the President's address, articles entitled :

"Some economic features of International Entomology," by F. M. Webster.

"The farmer's garden and its insect foes," by the Rev. Thomas W. Fyles.

"Entomology in schools," by Wm. Lochhead, Ont. Agr. College, Guelph.

"Injurious insects in 1898," by Dr. James Fletcher, Ottawa.

And a number of short papers of great value.

In the president's address attention is drawn to some remarkable experiments, of interest to biologists, made by Mr. Henry E. Crampton, jr., of the Department of Zoology of Columbia University. Mr. Crampton succeeded, in a number of instances, in grafting one insect in the pupal stage upon another in the same condition. For instance, he cut off the head portion of one chrysalis and several segments of the abdomen from another, and then joined the main portions of the two by means of a ring of paraffin. Coalascence was completed and, after a time, a living, eight-winged monstrosity was produced.

The disposition evinced by some, in the present day, to tamper unnecessarily with the nomenclature and classification of insects, now accepted, is also spoken of. Our systems are not perfect, but the day for a thorough revision of them has not yet come, and will not till the life histories of the various species, and the literature respecting them are better known. The late Dr. Lintner did excellent work in tracing such histories, and in heading his remarks with names and synonyms and references to authors. His work in these respects as in others is a model for entomologists.

In connection with this subject, the paper by Mr. Dwight Brainerd, in this same report, on "The preparation of specimens for the exhibition of life histories in the cabinet" will be found valuable. The plate that accompanies it shows groups of insects in all stages. There are the eggs, the larva, the pupa, the perfect insects (both types and varieties), the wings denuded of scales to show the venation, and the parasites that assail the species. From an educational point of view, a complete collection on Mr. Brainerd's plan would indeed be accounted a treasure. The article is the more valuable because the author describes his methods of preparing specimens for the cabinet.

Another important paper in the report is Prof. Wm. Lochhead's "Entomology in the Schools", showing *Why? How? and When?* the subject should be brought before the rising generation.

It is hoped that sufficient has been said to show that the society's publications are of value. Prepared chiefly for the agricultural community, its reports deal largely with troublesome insects and the methods of destroying them ; but the beautiful and beneficial species are not overlooked in them ; and even, as regards the less attractive kinds, so much that is wonderful in their structure and life histories is made known to us—so clearly is it shown that through and beyond the trouble they may give to man, destructive insects have important parts to play in the economy of nature, that our admiration is excited, and we feel the truth so quaintly expressed by the Rev. George Herbert :

"Nothing we see but means our good,
As our delight, or as our treasure ;
The whole is either our cupboard of food
Or cabinet of pleasure.

THE NATIVE HOME OF THE SAN JOSE SCALE.

By F. M. Webster, Wooster, O.

In the July, 1898, number of the Canadian Entomologist, I published a short discussion on this subject, giving the results of some, then recent, examinations of nursery stock, coming directly from Japan. I there also referred to a short note by Prof. T.D.A. Cockerell, in Entomological News, Vol 9, pages 95 and 96, to the effect that Mr. Alexander Craw, Quarantine officer at San Francisco, California, had two or three times found this insect on trees from Japan, and notably on a plum tree that arrived Jan. 25th, 1898. After this note of mine had been published, Mr. F. A. Sirine, one of the entomologists of the New York Experiment Station, located at Jamaica, N.Y., wrote me that there was some pretty good evidence in his possession indicating that the San José Scale had been established on Long Island a much greater length of time than was supposed; that its occurrence there possibly antedated its appearance in New Jersey. When I prepared my paper for the 1898 meeting of the Entomological Society of Ontario, entitled "Some International Problems in Applied Entomology," and, on again going over my notes, it appeared to me that, with the amount of material in my possession and its appearance, I had sufficient evidence not only to verify all that had been stated or written, but that I had almost the conclusive evidence wanted to prove that Japan was the original home of the scale, and that it was, as with the Gypsy moth, being kept reduced and in subjection by its natural enemies. I did not, at the time, have in my possession a paper published in the June, 1898, Massachusetts Crop Report by Mr. A. H. Kirkland, in which he makes the following statements:

"While it is generally conceded that 1887 marks the date of the first importation of the scale to the east, a case has recently come to the writer's attention that would indicate the possibility of the occurrence of the San José Scale in a Long Island nursery at a date somewhat earlier than that of the New Jersey infestation, and possibly as a result of the direct importation of trees from Japan. The facts are these:

In the vicinity of Boston there is an educational institution where particular attention is given to the study of trees and shrubs. On the grounds of this institution, there is a colony of the San Jose Scale which is confined in great measure to a plot of perhaps thirty Japanese quince bushes. These bushes, according to the testimony of those in charge of the grounds, "have been infested for many years." Careful records of all trees planted are kept by the authorities of the institution, and in this case the records show that the bushes in question were purchased from three sources: the firm of James Veitch & Sons, London, England, in 1881; Louis Spath, Rixdorf, Berlin, Germany, in 1888; and the Parsons & Sons Company, Flushing, Long Island, in 1884. The greater part of the bushes were obtained from the latter source, and these are infested to the greatest extent, although the scale occurs on all of them. The infestation of this nursery for many years past is a matter of common knowledge among entomologists and nurserymen; also the fact that this nursery has paid especial attention to the importation and distribution of Japanese stock. Unfortunately, all these Japanese quinces were grown for one season in a very compact plot and their infestation is so general that it is impossible to decide which were the ones originally infested. From an inspection of the grounds, it is evident that these bushes are the centre of infestation in this colony; and, unless it is shown that the English and German nurseries are infested, of which there is no evidence at present, the natural inference is that the Long Island nursery is the source from which the infested stock was obtained, thus antedating the New Jersey occurrence by about three years. Again, the conclusion that the Long Island stock was the source of the scale at this particular locality may be placed the length of time elapsing since its purchase,—some fourteen years. The time required for the killing of trees by the scale is placed by Messrs. Howard and Marlatt at from two to three years. In the south, where the active season of the insect is longer than it is here, and the warmer climate more favorable to its multiplication, undoubtedly this may be the case. It is also prob-

able that a longer time is required for the destruction of trees from this cause in this region; for we have records of an apple orchard at Scituate, Mass., planted in 1892 with infested trees two or three years old, of which about 90 per cent., although very badly affected, were alive in 1897, at which time remedial measures were applied. Since a Japanese quince with vigorous roots will throw out an abundance of new shoots year after year as the old wood dies off, the continued infestation since 1884 of the bushes previously mentioned does not seem beyond the limits of possibility."

Quite recently, some exceptions have been taken to the statement that I made in my paper last year, presented to the Entomological Society of Ontario, in which I used these words, "I have been able to prove almost conclusively that Japan is the original home of the San Jose Scale." The arguments against this are that Mr. Koebele and some of the Japanese entomologists searched for San Jose Scale in Japan, but did not find it. If this means anything at all, it might mean that the scale was present but kept thoroughly in subjection by its natural enemies, and perhaps some other resistent elements of which we are, as yet, unacquainted. Another argument is that the scale may have been introduced into Japan, from California, and was now, for the first time, being received back again from that country. At present, we have no record of any very old introductions of nursery stock from California into Japan, and if there were, it would be difficult to prove, or even to show evidence that these were infested with the San Jose Scale. The nursery stock that I have myself examined came direct from Japan, and gave every possible indication of its having been quite numerous where the stock was grown; and the occurrence differed very materially in appearance from the ordinary occurrence upon nursery stock, as witnessed in this country. Up to the present time, I see no reason whatever for modifying the statements that I have made. I do not claim that there is, as yet, conclusive proof that the scale came to us originally from Japan, but that the evidence points almost conclusively in that direction, I feel as confident as I did when I prepared my previous statements. Of course, there is nothing left to do but trust to time and future investigations to solve the problem. Entomologists in Japan can certainly throw a great deal of light upon this problem, and if the question can be settled, finally, either in the affirmative or negative, I shall be entirely satisfied. I do not care a straw whether the San Jose Scale is, originally, a native of Japan or not, but I do care a great deal as an entomologist, to know just the fact in the case, not as a matter of self-interest but as a scientific fact.

SOME NOTES ON THE LARVAL HABITS OF THE GRAY HAIR-STREAK BUTTERFLY.

(Uranotes melinus, Hubn.)

By F. M. Webster, Wooster, Ohio.

The larvæ of the Gray Hair-streak have long been known to injure beans by eating their way into the pods and devouring the young growing beans therein. In Insect Life, Vol. VII, p. 354, the statement is made that these larvæ, though long known as injurious to the hop, had also been known to injure young beans in New Jersey, District of of Columbia and California.

On July 3, 1899, a correspondent of mine, Mr. Henry Hurd, Carthagenia, Ohio, sent me a pea pod in which he had found a worm of some sort, eating the peas. The pod reached me in good condition, and clearly indicated the seriousness of the attack, but the depredator had eaten out of the box and through the wrapper, and doubtless was lost in the mail sack. On July 10, Mr. Hurd sent a second larva, which reached me alive, but it never developed. Mr. Hurd stated the first one sent, ate three grown peas and gnawed into a second pod within the space of a few minutes.

On July 7, the Station janitor brought me some larvæ which he stated were eating into the pods of his garden beans. These larvæ were placed on a hill of beans and covered with a breeding cage. On August 8, a single adult *Uranotes (Thecla) melinus*, Hübn, was found dead in the cage.

On August 14, a correspondent, Mr. Fred. Ruth, Clifford, Ohio, sent two larvæ which he had found in the silk in the tips of the ears of corn in the field. As he had found adults of *Diabrotica longicornis* in the same situation, Mr. Ruth supposed that they were the adult insect from these larvæ. As soon as they were received they were at once recognized and placed upon young bean pods, upon which they at once began to feed. On August 22, both pupated, and from one of these pupæ an adult issued on September 1, while the other has up to this date, October 4, remained undeveloped.*

While we lost the first larva sent by Mr. Hurd, the second was recognized, and if it was not of the species under consideration, it certainly belonged to a species closely allied to this. Thus we have the pea as a probably new food plant, and the silk of corn on the ear as an undoubted additional new food plant for the species, and certainly rather a unique locality for the larvæ to be found in.

According to the article referred to in the beginning, which by the way is illustrated, the habitat of the species is given as Canada (rarely); and south to Indian River, Florida, and quite to the Mexican border, Mexico, Central America, Venezuela and the Antilles. The present is the first year that my attention has ever been called to the work of the larvæ.

SAN JOSE SCALE.

The meeting was called to order at 2.30 o'clock, the Vice-President, Rev. Dr. Fyles, occupying the chair. After a number of papers (which are given in subsequent pages of this report) had been read and discussed, the consideration of the San Jose Scale insect was again taken up. The Secretary reported that the Special Committee had been unable to arrange any time for a meeting. Mr. Dearness said that as the whole of the previous afternoon had been spent in a conference upon this insect, it would be a pity if no action were taken by the Society; he accordingly moved that the meeting be considered as a committee of the whole, which was adopted.

At the request of the members present Mr. Dearness read a synopsis of the report of the Commissioners appointed by the Hon. the Minister of Agriculture to investigate the San Jose Scale last summer, and explained various points in connection with it.

Dr. FLETCHER said that one of the great difficulties in the way of carrying out the recommendations of the Commissioners was the liability of the orchard owners to evade the law as far as possible, and to neglect the means recommended for checking the pest. The feature of the report which would probably be most objected to was the boarding of the men sent by the Government to perform the work, but this might be overcome by sending them to the nearest hotel for the short time that they would be in the neighbourhood. He thought that the Minister of Agriculture had acted very wisely throughout this matter, and that great care had been exercised in the selection of inspectors; if any were found inefficient their services were at once dispensed with.

After some further discussion the following resolution, moved by Dr. FLETCHER and seconded by Dr. BETHUNE, was unanimously adopted:

"This Society has watched with keen interest and wishes to express its hearty approval of the measures adopted by the Hon. the Minister of Agriculture and Arts for Ontario for the suppression of the San Jose Scale, and the wise and judicious manner in which he has endeavoured to carry them out."

* From this pupa the butterfly emerged on January 4th, 1900, thus shewing that of two larvæ, probably from the same brood and same mother, one may develop to the adult in September, and the other go over until the following spring.—F.M.W.

Several other papers were read and discussed, including the reports of the Directors on the noteworthy insects of the year in their respective divisions.

Dr. Fletcher exhibited some rare or otherwise interesting specimens, several of which he presented to the Society.

Hemileuca Maia var *Lucina*. This is the form of the species which occurs in Manitoba, the specimens presented had been taken by Mr. Norman Criddle, at Aweme, in Manitoba. In July, 1898, Dr. Fletcher had taken two nearly full grown larvae feeding on aspen at Bird's Hill a few miles from Winnipeg, and had bred the moths the same autumn. Variety *Lucina* differs from the species in the much greater area of white on the wings.

Colias Emilia—A fine pair presented which had been taken by Mr. C. de B. Green at Osoyoos. The eggs of this species are laid on *Astragalus frigidus*. It is a larger species than *Colias Christina*, some forms of which it resembles, particularly in the female sex. The eggs of *C Christina* Dr. Fletcher had seen deposited by the females on *Salix desertorum* at Olds, N.W.T.

Colias Edwardsii exhibited, which had been collected and seen in some numbers at Arcola, Glen Adelaide, Clare, Alameda, Carnduff and Gainsboro, in the south eastern part of the N.W.T. Females were seen ovipositing and eggs were collected on the Prairie Bean, *Thermopsis rhombifolia*. This species resembles closely *C. Alexandra*, but is smaller and has the margins partly fringed with pink.

Pamphila Manitoba, var *Assiniboia*, specimens of both sexes presented which had been taken at Regina in 1886.

Chrysophanus Helloides, var *Florus* (female) presented, taken at Vernon, B.C.

Argynnis Chariclea presented, taken at Mount Cheam, B.C.

Coenonympha inornata, presented, taken in large numbers in the N.W.T. this year.

Vanessa Californica, presented, one of the first specimens taken in Canada, caught in Victoria, B.C., 1885.

Carterocephalus Mandan, presented, a large form taken at Laggan in the Rocky Mountains which has been written about in the Canadian Entomologist by Mr. T. E. Bean in 1893 as *C. Palæmon*.

Lyda multisignata, a new pest of the raspberry. The specimens presented were bred from larvae, which had been sent from St. John, N.B., where they had been injurious for three years.

Crioceris asparagi and *C. 12-punctata*, the two asparagus beetles; first recorded as injuring asparagus in Canada this year. Both forms were abundant at Queenstown and other places in the Niagara peninsula.

Gonioctena pallida, specimens were presented. This beetle has been very abundant in many parts of the Northwest and Manitoba for three seasons. Aspen poplars have been entirely defoliated over large areas. They were less numerous last summer.

The following were exhibited :—

Lepisesia ulalume, a very rare species representing on the Pacific coast the eastern *L. flavofasciata*. The specimens were taken at New Westminster by Mr. Dashwood-Jones. The flight of *L. flavofasciata* was described and its close resemblance to a bumble bee when flying referred to.

Thecla strigosa bred from larvae found attacking green plums by Mr. W. M. Orr. at Fruitland, Ont.

Thecla Iroides, bred from larvae eating green apples at B.C., found by Mr. E. A. Carew-Gibson. The habit of boring into their food had also been noticed with the young larvae of *Thecla Niphon* which feeds on the young shoots of white pine.

Erebia Epipsodea. This species had been bred again this year from eggs received from Mr. N. B. Sanson, of Banff, Alta. There were only three moults as had been

previously recorded by Mr. Lyman, but the mode of pupation was slightly different from that described by Messrs. Lyman and W. H. Edwards, the chrysalis being surrounded by several spans of silk in the same way as had been observed by the speaker in the case of *E. Discoidalis*. *E. Epipsodea* is an abundant species on the prairie from the western borders of Manitoba through the Rocky Mountains to the interior plateau of British Columbia. It was seen in hundreds on the prairies in the early part of last July.

Heliothis armiger. A specimen bred from a green larva found feeding upon geraniums in a greenhouse, late in the autumn of 1898, the moth of which had emerged in the summer of 1899.

Chinobas Macounii, eggs were shown which were laid by a female among the thorns on the dead twigs of a wild rose, at Nepigon. The bush was standing in full sunlight on a sandy bank and no plant of Carex or grass could be found within 10 feet. The female was seen to lay three eggs all on the dead twigs. These hatched in the ordinary time of 15 days.

Chrysophanus Thoe. Full grown living larvæ were shown, reared from eggs laid in confinement late in August. Of about 40 eggs half had hatched, but in nature it was thought by the speaker that as a rule the eggs did not hatch until the following spring. He had discovered that the females laid their eggs not on the seed pods of the dock, as had been previously thought, but low down on the root leaves and at the base of the stem, where they would be covered up with snow during the winter. Many eggs were found on plants growing in the water, and within an inch of the surface. The larvæ during the three moults, as well as the beautiful green and pink pupæ, were shown, also brown pupæ and a dipterous parasite (*Exorista confinis*). Larvæ and eggs had been found on *Rumex orbiculatus*, but larvæ fed readily on all docks offered except *Rumex obtusifolius*.

A beautiful collection of inflated larvæ, prepared by Mr. C. H. Young, of Ottawa, was exhibited, and, the value of this method of preserving a permanent record of larvæ for study was urged. Mr. Arthur Gibson, Assistant in the Division of Entomology, had also prepared some nice specimens, which were exhibited.

Lycæna Anna—A fine series of this rare species was exhibited with the larvæ and pupæ. Almost full grown larvæ had been found on the 8th of August last at a height of 7,000 feet on Mount Che-am, B. C. The larvæ are green, and feed on the leaves of lupins. The interesting discovery was made that the larvæ when full grown crawl down the stem and burrow down to pupate, from an inch to two inches beneath the surface of the ground, as a rule following the stem and remaining attached to it. Five females and three males were exhibited. These showed considerable difference in the markings of the lower side.

Benacus griseus—A specimen of this large water-bug, taken at Toronto, was shown, and the difference between this species and *Belostoma Americana* pointed out. The members were asked to examine all large water-bugs seen beneath electric lights, so that the range of the two species might be ascertained. Although sought for carefully at Ottawa, *Benacus* had never been detected there. In *Benacus* there is no deep groove down the middle of the cushion-like area on the front raptorial claws.

The Pea Aphis, *Nectarophora destructor* Jnsn. (n. sp) Specimens of the Destructive Pea Aphis, together with three parasites, were shown, and a statement made as to the injuries inflicted by this pest during the past summer. Colonies had appeared in various places from the Maritime Provinces to the western portions of Ontario.

On motion of Mr. W. E. Saunders, seconded by Mr. Balkwill, it was resolved that the thanks of the Society are due and are hereby offered to Dr. Fletcher for his kindness this year, and on many previous occasions, in presenting a number of valuable insects to the Society's collection.

The meeting adjourned at 4.30 p.m. in order to enable the members from a distance to catch their respective trains. It was the unanimous opinion of all present that this was the most useful, interesting, and also entertaining, meeting that the Society has ever held.

NOTES ON SOME INSECTS OF CONIFEROUS SHADE TREES.

By Prof. W. Lochhead, Ontario Agricultural College, Guelph.

Chermes Abietis (Spruce Gall Louse). Many complaints were made in May about an insect which was attacking spruce trees. The terminal, young shoots were first attacked, then the immature leaves of the buds became enlarged at their base, and the tissues were gradually killed, so that the twigs curled up and died. Conspicuous woolly secretions were observed on the leaves of the spruce about the first week in May. These secretions enveloped masses of yellowish eggs (200 to 300 in number). About a week later the eggs hatched, and the young lice moved to the bases of the young leaves of the shoots, when enlargements began to form. A fine spruce hedge at the Agricultural College was infested so badly that it was feared that the fine trees would be permanently disfigured, and even destroyed. An examination of the new leaves revealed a louse at the base of nearly every new leaf, and the deformation of the twig were becoming quite evident. A later examination showed the presence of several fat syrphus larvæ, which had taken up their quarters at the bases of the leaves, and were feeding quite greedily on the lice. Many other buds were examined from different parts of the hedge, and in every case syrphus larvæ were found. To spray this tall hedge with whale oil soap and tobacco solution appeared a gigantic task, and to clip off the infested twigs was not to be thought of, as such an operation would be a life's task. Just at this juncture, when there seemed no other expedient but to leave the control of the lice to the syrphids, Dr. Howard, of Washington, who had been consulted in the matter, wrote as follows:

Fig. 8. Spruce Gall Louse. (*a*) Summer form of nymph. (*b*) A sprig of White Spruce, with one twig affected by galls produced by the young lice.

"Your best hope of relief seems to be in the probable ultimate appearance of some parasitic or predaceous enemy; and, when the gall louse is as abundant as you describe, I think relief in this direction will shortly be forthcoming."

Accordingly the lice were left to the tender mercies of the syrphids.

Observations during the remainder of the season were made rather intermittently on account of absence from College for several weeks; but, on August 19th, another examination of the galls and twigs was made. Woolly secretions were again observed which contained masses of eggs (30 to 40 in number). A few adult winged forms and many young lice were seen but in numbers not to be compared with those seen in May. Many syrphus larvæ were again found. On August 31st some of the infested twigs were again examined, but there were very few lice, no eggs and no adults, while the syrphids were quite numerous, and occupied tunnels in the leaf bases between the galls.

That Nature has done her work well, it is sufficient to state that the hedge never looked better than at present. Later shoots have appeared, and a stranger could scarcely tell that an insidious pest had started to work there in the spring.

Professors Fernald and Cooley, of Amherst, issued a bulletin on *Chermes abietis* during the winter. As the observations of the life-history of the Spruce Gall Louse at Guelph correspond very closely with those of Fernald and Cooley, a synopsis of the life-history is here given :

Summer Brood :

1.—In early spring—white woolly mass containing about 300 eggs, on new shoots.

2.—Eggs hatch in about one week, and nymphs settle in bases of young shoots.

3.—Three moults ; antennae of 3 segments.

4.—About Aug. 10, winged adults—females—appear, antennae of 5 segments.

5.—Two days later eggs (40) are laid covered with a woolly secretion near tip of leaf.

6.—Eggs hatch in two weeks.

Winter Brood :

7.—Nymphs, antennae of 3 segments, spread over limbs near by, some attaching themselves to leaves, some at axils.

8.—Pass winter at base of buds, nearly all killed.

9.—About April 20, moulting begins, and nymphs grow very rapidly, secreting a copious woolly coating.

10.—Eggs are laid about May 1–10, and females soon die.

References :

1844. Ratzeburg—Forest Insects—p. 200.

1869. Packard—Guide to the Study of Insects—p. 522.

1876. Thomas—Transactions Illinois Hort. Soc.—p. 198.

1881. Ormerod—Manual of Injurious Insects—p.p 240–244.

1888. Comstock—Introduction to Entomology—p. 160.

1890. Packard—Forest Insects—p. 853.

Buckton—British Aphides, vol. IV.—p. 31.

1896. Cholodkowski—Zoolog. anzeig, Jan. 1896—p. 37.

1898. Brodie—Bureau of Forestry, Ont. Dep. Ag.—The Spruce Gall-Louse.

1898. Fernald and Cooley—The Spruce Gall-Louse.

Lygœonematus (Nematus) Erichsonii (Larch Saw F'y.) On June 1st many adult females were observed ovipositing on the underside of the stems of the terminal shoots of the larch or tamarack.

During oviposition the female hangs head downwards, and the eggs are laid in incisions on the under side of the axis of the terminal shoots. (Fig. 9, *c.*).

The slits in which the eggs were placed very closely were made in two rows. The eggs were of a glassy white color and spindle-shaped.

On June 5th but few females were found. The axis of the shoots on which the eggs had been laid were turning brown, and were bending, owing to the death of the tissues in the region of the slits.

Three days later (June 8th) minute larvæ varying from $\frac{1}{4}$ to $\frac{1}{3}$ of an inch in length were found. Their heads and the six true legs were shining jet-black. The larvæ have the habit of curling their tails over their backs whenever disturbed.

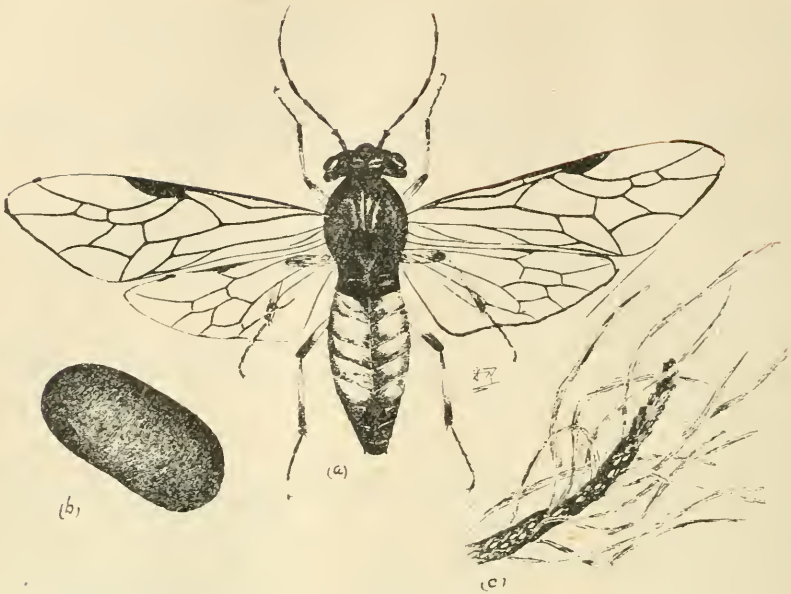


Fig. 9. Larch Saw-Fly. (*a*), the saw-fly with wings outspread; (*b*), the brown pupa case; (*c*) terminal twig of larch showing eggs in slits made by the female saw-fly.

On June 10th the larch grove was sprayed with Paris Green ($\frac{1}{2}$ lb. to the barrel), but as this solution was rather weak, and as many of the trees towards the centre of the grove could not be thoroughly sprayed, or even sprayed at all, the trees were found to be still infested three weeks later.

The larvæ grow rapidly, and at maturity are nearly one inch in length. The defoliation of the larger trees near the centre of the grove was almost complete.

On July 20th no larvae could be found; those that had survived the Paris Green had descended to the ground, and pupated. The oval, spindle-shaped pupæ (Fig. 9 *b*) could be found quite abundantly under the trees among the litter of leaves. These remain in the ground all winter, and the adults will emerge about the end of May.

References:

1844. Ratzeburg—Forest Insects—p. 121.
1881. Hagen—Can. Ent.—p. 37.
1883. Fyles—An. Rep. Ent. Soc. Ont.—p. 17.
1884. Fletcher—An. Rep. Ent. Soc. Ont.—pp. 72, 77.
" Harrington— " p. 68.
" Fletcher—Can. Ent., Nov.
" Fyles—Can. Ent., Nov.
1885. Fyles—An. Rep. Ent. Soc. Ont.—p. 12.
1886. Jack— " p, 16.
1887. Lintner— " p. 32.
1888. Saunders— " p, 31.
1889. Howard— " p. 26.
" Fletcher— " p. 38.

1889. Lintner—Fifth Rep. N. Y. State—pp. 164–173.
1890. Packard—U. S. Ent. Com. V. Rep., Forest Insects—p. 879.
1891. Fyles—Am. Rep. Ent. Soc. Ont.—pp. 28, 30.
1893. Harrington— " —pp. 19, 21.
" Lintner—Eighth Rep. N. Y. State—pp. 168, 169.
1894. Fyles—Am. Rep. Ent. Soc. Ont.—pp. 4, 5.
1896. Marlatt—Revision of the Nematinae of North America—pp. 111, 112.
1898. Hutt—Am. Rep. Ent. Soc. Ont.—p. 94.

Lyda sp.; (Colorado Spruce Saw-Fly.) On May 30th several black saw-flies were observed resting on the leaves of an ornamental spruce, the Colorado spruce (Picea fulgens), on the College grounds. These saw-flies had a wing expanse of one inch and a quarter, while the body was nearly three-quarters of an inch in length. On several of the branches were large masses of castings which were over two inches in diameter. These masses of castings were never situated at the ends of the branches, but about midway on the branches. The leaves in the neighborhood of the castings had been eaten by the large greenish-black larvæ which occupied silk-lined tunnels within the mass. (Fig. 10.)

Fig. 10.

No eggs could be found at the time the adults were seen. A good spraying of Paris Green was given, since which operation no larvæ have been found. It is evident that the Lyda saw fly is a very destructive insect to this spruce, and should conditions ever arise when the larvæ were numerous, the damage would be very considerable

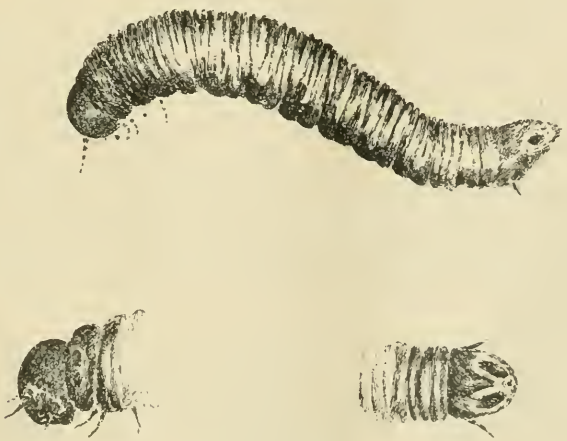


Fig. 11.

The adults are larger than the adults of the larch saw-fly. Their abdomen is depressed and flattened. Their front wings are about as long as the thorax and abdomen

together, and across the middle of each wing is a cloudy band. Their feelers or antennae, composed of many joints, are long and setaceous.

Their legs are light yellow in color, as are also the basal joints of the antennae and the mandibles. The tarsi of all the legs have five segments.

The caterpillars (Fig. 11) when full-grown are about an inch and quarter long. The head, the dorsal portion of the first segment of the thorax, and under surface of the whole thorax are black. The body is dull olive-green in color, and very much wrinkled. There is a prominent zig-zag lateral line on each side at the junction of sternite and pleurite. There is also a prominent V-shaped ridge on the upper surface of last segment, and the depressed areas between this ridge and the elevated lateral ridge are black, as is also the lower surface of the last segment. The antennae are short and 7-jointed; the last pair of legs are 3-jointed.

Curiously enough the larva corresponds very closely with an undetermined larva, figured and described by Packard in his *Forest Insects*, page 852. Dr. Packard does not appear to have seen the adult.

THE ELECTRIC LIGHT AS AN ATTRACTION TO MOTHS.

By Arthur Gibson, Assistant-Entomologist, Central Experimental Farm, Ottawa.

A good deal has been written of late years on the many beautiful and rare moths which have been captured while collecting around the electric lights of cities and towns. The attraction that these lights have for moths, especially in situations on the outskirts of a locality, is really astonishing, and the number of different species secured in a single season from a few visits to these lights is very considerable. Much useful work can in this way be accomplished, and many species which are seldom met with otherwise are quite often taken at the electric lights.

On warm, close, rainy-like nights especially, particularly in the month of June, swarms of insects of almost all kinds congregate around the electric lights, varying in size from the large Attacus Cecropia emperor moth, down to the tiniest of species. On cool, raw nights also moths are to be found fluttering around the lights, these conditions seemingly making little difference to them, and on nights when it is even pouring rain many species of moths are observable. Even this does not apparently lessen the attraction which the electric lights have for these insects, and on a visit on almost any night during the collecting season, moths of some kind are sure to be found.

I have often noticed and wondered at the abundance of males, and the scarcity of females around the electric lights. I have taken many males, of numbers of species, but have yet to take females of these, and even amongst our commonest species the males predominate to a large extent. Of course, it must be remembered that the females do not move around or fly such distances as the males do, generally staying near their food plant on which they lay their eggs. The males, on the other hand, being much stronger fly quite long distances, no doubt one reason being their endeavor to search for and locate the females, and in this way they come in contact more readily with the electric lights. Unless, therefore, the electric lights are so situated as to be in close proximity to the food plants, near where the females have emerged, it is likely that the collector would find but few of them. This may be one, and an important, reason for the scarcity of the females around the electric lights.

Many moths have a habit of circling around the electric light, and in a short time alighting on the telegraph pole, where, in numerous cases, they generally rest a long time, in fact, often until daybreak, and I have even found them there at all hours of the day. Specimens which have alighted on the poles are, of course, mostly easily captured, but those which circle round for half an hour, and even longer, tend considerably to try the collector's patience, but in the end he is often rewarded by either netting the specimen after it has circled lower, or else capturing it when with a sudden dart it descends,

striking the ground. Quickness, however, is needed in the latter case, as quite frequently the specimen ascends again with as much rapidity as it descended. Sphingidae are particularly quick in this respect, and the collector has to be on the alert, and capture the specimen as soon as it descends, On the other hand, numbers of other moths are quite within reach and easy to catch, as they fly anywhere within the rays of the electric lights, not always flying close to the globe. Geometers are especially noticeable in this regard, and can be taken without much trouble. The large emperor moths have a habit of flapping near the ground, and are then generally easily caught.

The brilliant illumination from the arc lights seems to have a dazzling effect on many species, as after fluttering around for a time they often seek the dark, or shady, side of the telegraph pole, where they are often found resting. This I have noticed among many of the sphingidae, and more often among the arctiidae, the tiger moths being especially conspicuous in this respect. Many of the noctuids also are apparently dazzled, and hide from the light.

I have found that where another pole is within a few feet of the pole from which the electric light is suspended, numbers of "good things" seek a resting place thereon, and these are generally within easy capture. Those out of reach I have often dislodged by throwing up a piece of sod, or else a handful of caked mud. Some collectors use long rods with a net on the end for this purpose, but for my part I have found this a needless trouble, and the appliance is not always easy to handle, and it is difficult and often impossible to place the net just where it is wanted. In Ottawa the electric light poles have iron attachments, which are used by the electric linemen to climb the poles when the carbons require replacing in the globes, or the lamps repairing. It is therefore not much trouble for us to secure specimens which are resting on the poles. In Toronto, where I collected for a number of years, the globes have all to be lowered by the linemen for repairs, etc., and the poles do not have these iron attachments, consequently we had to devise other means whereby to secure the specimens. We first of all tried these long rods with the net on the end, and of course, with this aid secured many moths, but on the other hand many were still out of reach, so we afterwards discarded the long rods and generally secured any specimens we desired by simply throwing a piece of old sod, or caked mud at the moths, dislodging them from their place of rest, when they generally fell to the ground and were quickly bottled. At the entrance to the Experimental Farm at Ottawa is one of the best electric lights that I have ever collected at; within a few feet of this stands a telegraph pole, and during the past summer we took quite a large number of beautiful and rare moths while they were resting upon this pole, a much larger number of specimens being taken off this pole than off the one from which the light is suspended.

The best hours I have experienced for collecting at electric light are from 9 o'clock to about half past 10 o'clock, and after 12 o'clock to about 2 o'clock. I have never stayed later than this but I have been told by collectors who have stopped around the lights all night, that they took very few specimens after the latter hour. The earlier part of the evening until half past 10 o'clock or so seems to be the most productive.

If the collector is interested in breeding moths from the egg to the imago, the electric light furnishes a great help toward this end, as when a female is captured if it is desirable to obtain eggs, all that is necessary to do is to enclose her in a box, when she will, as a rule, deposit at least a portion of her eggs, provided she has not laid them before capture. I have often secured specimens in this way and had the pleasure of breeding the specimens to maturity. As an example I might cite that during the past summer I took a female of Euprepia caja, while collecting at the electric light, putting her in a box alive where she remained the whole night. By the next morning she had laid nine eggs, five of which hatched. I have succeeded in getting two of these larvæ past the sixth moult, and both, on the 9th inst. started to spin a slight cocoon. This occurrence is very remarkable as the larvæ of Euprepia caja are known to hibernate through the winter, but the reason mine have passed through all their stages and spun a cocoon, is probably no doubt due to the fact that they were kept very clean in doors and given

fresh food plant generally twice a day. I have taken descriptions of the different stages and will probably later on publish my notes in the Canadian Entomologist. Dr. Packard in his "Study of Insects" says that the larvæ of Euprepia caja moult from five to ten times. At the electric light females of moths are thus secured which might be hard to get otherwise.

While at the electric light, however, the collector has not everything his own way as there is another competitor, whose nature it is to also visit the lights for the purpose of catching moths and other insects. I refer to the bats which frequent the electric lights securing many a desirable species, the wings of which are often found, the bat being seemingly contented with the body portion. The size of the moth does not in the least seem to frighten the bat as I have seen him catch and fly away with as large a species as Telea polyphemus. The moths when chased by the bat make a desperate effort to get away, but in the end they are generally captured. Some, however succeed in evading the bat by flying straight up in the air just at the time the bat makes a swoop upon them. Many a specimen which looks to be a "nice thing" has been caught by these bats, much to the collector's regret. Sparrows also pick many specimens from off the poles in early morning, the moths having rested there until that time. Constant visitors to the electric lights are the toads which hop nimbly along the ground and snap up many a treasure that might otherwise have graced the entomologist's cabinet.

I have brought to the meeting some of the captures which we have been fortunate enough to make at the electric lights during the past summer. These no doubt may be of interest to the members present.

INJURIOUS INSECTS OF THE ORCHARD, GARDEN AND FARM FOR THE SEASON OF 1899.

By Prof. W. Lochhead, Ontario Agricultural College, Guelph.

The unusual severity of the past winter led many persons to anticipate a reduction in the numbers of injurious insects on account of the probable freezing of many of the forms which hibernate as pupæ or adults, but such an anticipation has not been realized, as most of the pests of past seasons have been quite as numerous and injurious this season.

The Orchard.

The Codling-Worm has again been active, and the damage done to the apple has been very considerable (Fig. 12). In the Guelph section the prolonged showery season during spraying time washed away the Paris Green from the calyx cups, so that the first meals of the young grubs were not poisonous. As there are two broods in the south-west part of the Province the orchardist should see that the first brood is exterminated, for if not, the second brood will do much damage to late apples. Last year many shippers lost heavily on account of the work done by the second brood, which is very hard to combat, from the fact that the members appear at very irregular intervals from August to October.

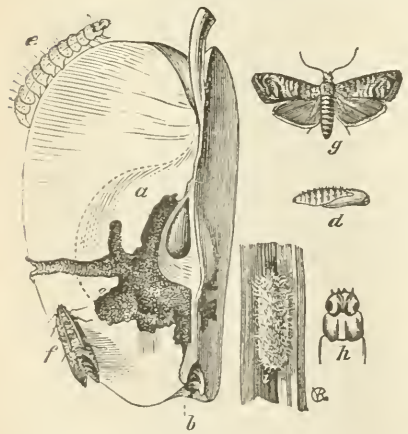


Fig. 12.

Fig. 13.

The work of the *Bud Moth* (Tmetocera ocellana) on the young buds was very noticeable in some localities where early applications of Paris Green were not made (Fig. 13). Experience has shown that one or two applica-

tions of a mixture of Paris Green and Bordeaux before the blossoms open are of great service not only in preventing the entrance of fungi, but also in killing young canker-worms and young bud-worms. The bud-worms, when they emerge from their silken cases in the spring, have shining black heads and the first segment behind the head also black.

Both species of *Tent Caterpillars* (Clisiocampa Americana (Fig. 15) and C. disstria (Fig. 14) were exceedingly numerous during the early spring, and did much harm in many sections. The farmers of the Province require to be aroused in this matter; they appear to make no effort to kill them during the most assailable period, viz., during the winter when the egg-masses (Fig. 15c) can be readily seen and destroyed, and during early spring when the caterpillars are small. Applications of Paris Green are very effective on the young caterpillar, but ineffective on the full-grown.

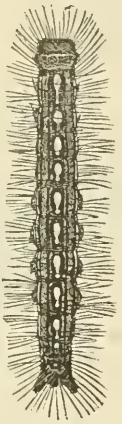


Fig. 14.

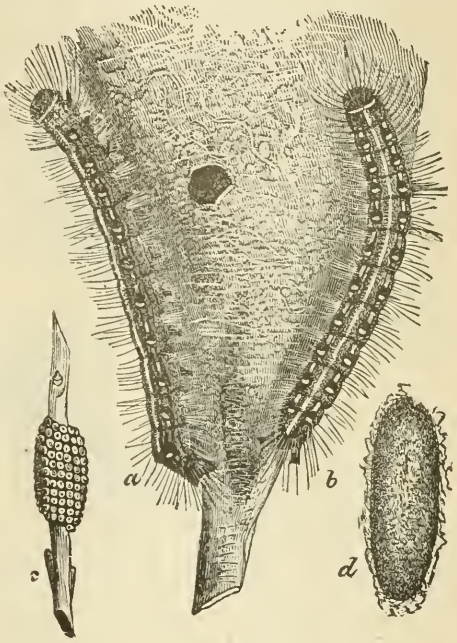


Fig. 15.

Many persons are under the impression that some plague comes over the full grown caterpillars when they suddenly disappear. It is true the caterpillars no longer exist as such, but it ought to be borne in mind that they have simply changed into pupæ within white cocoons (Fig. 15d), from which the moths will emerge about July to lay the bracelet of eggs on the twigs and branches.

Bonuses might be given to the children for all egg-masses destroyed, or all nests burned.

The *Scale Insects* have perhaps become the most serious pests in many districts. The San Jose Scale, which has become quite abundant in two or three localities, as well as remedies for its suppression, will be found fully treated in another part of this Report.

Fig. 16.

In some localities, chiefly in the San Jose infected areas, is found a scale *Aspidiotus ostreæ-formis*, which is very like the San Jose Scale, but apparently not nearly so destructive. Occasionally trees have been found which were quite badly infested, in which cases much harm was being done. Applications of whale-oil soap (2 lbs. to 1 gallon of water) during the winter will prevent the spread of this scale.

The Oyster-Shell Bark Louse (Mytilaspis pomorum) is doing much harm in many orchards which have been neglected (Fig. 16). Frequently specimens of branches were received, which were literally covered with this scale, yet the owners had overlooked its presence, and not until several trees had been killed was expert opinion invited. Applications of whale oil soap (2 lbs. to 1 gallon of water) during the winter, and dilute kerosene emulsion, about the end of May when the young lice are moving, will rid the trees of these pests, and in most cases give a new lease of life to the previously neglected trees.

The Scurfy Bark Louse (Chionaspis furfurus) is another scale which is too prevalent in many localities (Fig. 17). It can be treated in the same way as the Oyster-Shell Bark Louse.

The Woolly Aphis (Schizoneura lanigera) This insect is readily recognized by its woolly

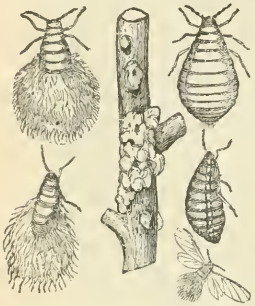


Fig. 18.

covering (Fig. 18). It can be readily treated with applications of kerosene emulsion or tobacco water. It infests apple trees.

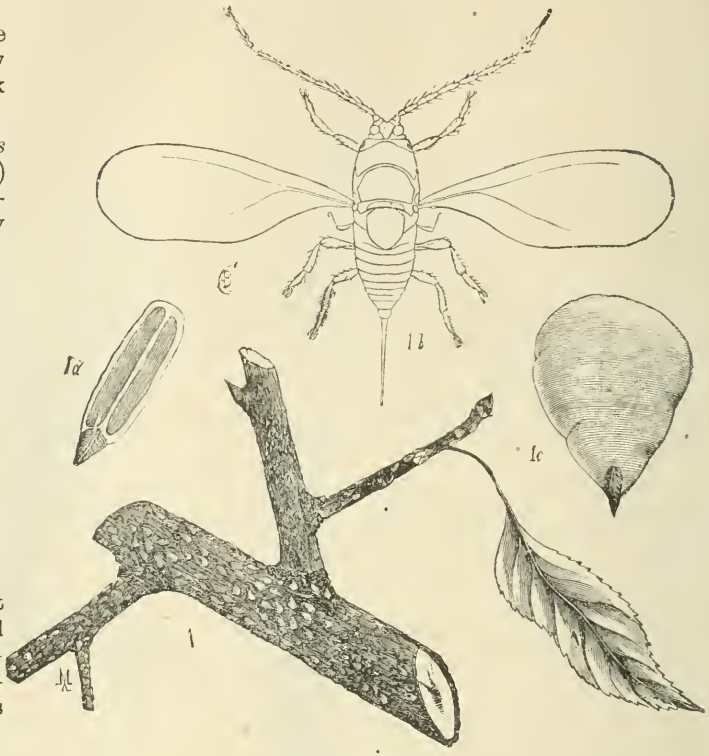


Fig. 17.

The Garden.

Slugs have been unusually plentiful, and those infesting the raspberry and strawberry were extremely troublesome. These are more dreaded than the other insects infesting these plants, inasmuch as they continue their depredations through the fruiting season, when it would be unsafe to use poison for their destruction.

Plant Lice or *Aphids* were quite troublesome on currants and gooseberries. They cause the leaves of the currant to wrinkle; in gooseberries rosettes or tufts at the tips of the branches are formed. Within these tufts can be found Aphids of all ages, and with these are the lady-birds trying their best to subdue them. The figures represent two common forms, Fig. 19 the 9-spotted, and Fig. 20 the 13-spotted.

Fig. 19.

Fig. 20.

The Raspberry Fruit Worm (Byturus unicolor) was more prevalent than usual this year. This small white worm about $\frac{1}{4}$ inch in length feeds on the flesh of the berry close to the receptacle. Their presence is often overlooked in the preparation of the fruit for the table.

At the College both the raspberry and the blackberry were slightly damaged by the presence of galls on many of their roots, produced by a cynipid (Rhodites radicum). Wherever the galls were present the canes were found to be lying prostrate on the ground and a few died from the effects.

The Colorado Beetle (Doryphora decemlineata) was just as abundant as ever at the College this year, but it has been frequently reported that the severe cold of last winter killed many hibernating adults, and that the supply was much below the normal.

Much annoyance was caused by the presence of a very small black flea-beetle (Epitrix cucumeris) Fig. 21, on both the potato and the tomato plants. This beetle about 1-16 inch in length, is black with a whitish pubescence. This insect works upon the upper side of the leaf and makes perforations. It is easily overcome with Paris Green.

Fig. 21.

Fig. 22.

Fig. 23.

The Cucumber Beetle (Diabrotica vittata) Fig. 22, was as usual a great nuisance on the cucumber, melon, squash, and pumpkin vines. Many inquiries were made as to the best mode of dealing with these beetles. The remedy we found to be most effective was Paris Green with considerable lime added, applied with a knap-sack pump. The rod had an elbow so that the under sides of the leaves were thoroughly sprayed This year applications of Paris Green were made whenever new leaves appeared.

The Squash Bug (Anasa tristis) Fig. 23, seemed to thrive this year in spite of every precaution. Decoy crops are generally very valuable, but were quite ineffective in most cases this year. Hand-picking of the leaves containing the clusters of eggs or nymphs was found very effective.

The Cabbage Worm (Pieris rapæ) was very plentiful this season, and did much damage to cabbage, turnip, and rape plants. In the case of cabbages the worms can be very successfully treated either by Paris Green and lime spray, or by dusting the leaves with insect powder, mixed with flower or ashes.

The Cabbage Aphis (Aphis brassicæ) did not appear in such numbers as they did last year, but the application of kerosene emulsion, diluted with 15 parts of water, to the under side of the leaves will practically exterminate them.

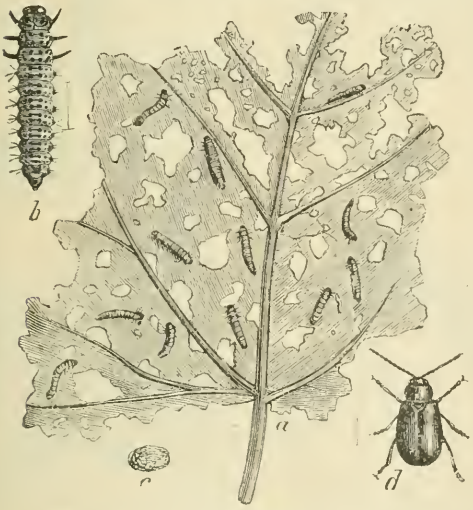


Fig. 24, *a*. larvæ on leaf, *b*. larvæ, *c*. egg, *d*. beetle (magnified).

The grape-vine had its usual enemies, but so far as my knowledge goes, the *Flea-beetle* (Haltica Chalybea) Fig. 24, was not so troublesome this year as usual, but it is still considered a bad pest. The best method of controlling it is, (1) to spray with Paris Green the buds which are just opening, and (2) again in June, when the larvæ are active, to spray with dilute kerosene. Many vine-yardists go among the vines and hand-pick the beetles, or jar the beetles into a cloth saturated with kerosene.

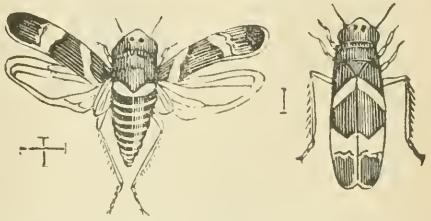


Fig. 25, Grape-vine Thrips (the hair-lines show natural size).

The *Thrips* or *Grape-Vine Leaf Hopper* (Erythroneura vitis), Fig. 25, was perhaps more injurious than the flea-beetle. It was especially troublesome to the Virginia Creeper during late summer. If the nymphs which appear in June are then sprayed with dilute Kerosene Emulsion, and an elbow used so that the spray will reach the underside of the leaves, little harm need be expected for the remainder of the season.

A new and somewhat alarming pest has arrived in the Niagara peninsula. Last year Mr. Kilman noted the arrival of the Asparagus Beetle (Crioceris asparagi) at the

Niagara River. This year it has made itself quite destructive in Lincoln and Welland Counties. Two species preying upon the asparagus have arrived simultaneously, *Crioceris Asparagi* and *Crioceris duodecempunctata.* The latter has a reddish body with black spots, the former steel blue with white spots. W. N. Hutt, B.S.A. has at my suggestion kept a record of the work and life history of the beetles, and has prepared a short paper, which I have pleasure in presenting to this meeting. These beetles were first noticed by Mr. Hutt about May 8th, on the second or third cutting of the asparagus. The larvæ hatch from the eggs in about a week, and change into pupæ in two weeks, and in about ten days later the adult beetle emerges from the ground. There are probably several broods in the season and Mr. Hutt remarks: "The broods of the insects seem to be very numerous and to overlap one another, so that *eggs*, *larvæ* and *beetles* may be found any time during the summer." The same observer states that the best remedial measures would be:

1. Frequent cultivation of the ground to disturb or destroy the insect in the pupa state.

2. The removal of all spindling stalks on which eggs might be deposited.

3. Thorough spraying after cutting has ceased.

The C. 12-punctata was by far the more common form in the Niagara district.

The Farm.

My experience leads me to the conclusion that the insects which usually trouble farm crops were not serious pests in many portions of the Province.

The Wheat Stem Maggot (Meromyza Americana) did some damage in some localities. (Fig. 26.) The "White Head" can be readily discerned among the other uninjured stems. Like the Hessian Fly the adult is a four-winged fly which lays its eggs about

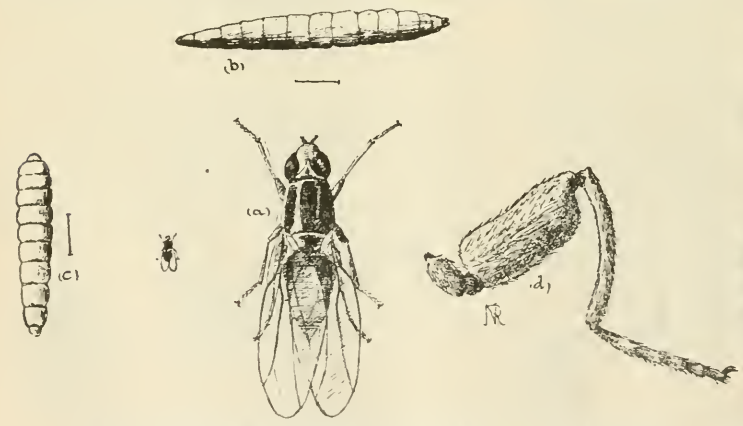


Fig. 26. The wheat-stem Maggot. *a.* The fly. *b.* The maggot. *c.* The pupa. *d.* Hind leg of fly, with large femur.

Fig. 27. The clover root borer. *a.a.a.* Excavations made by borer. *b.* grub. *c.* pupa. *d.* beetle.

May 15th, upon the stalk near the top point. The larva burrows into the stalk, and when mature is a worm about ¼ inch long. The flies emerge in July, to lay eggs for a second brood. Dr. Fletcher has determined three broods at Ottawa.

The pea crop still suffers very heavily from two very important pests, the *pea-weevil*, (Bruchus pisorum) and the *pea-moth* (Semasia nigricana). In Ontario the ravages of the pea-moth appear to be limited chiefly to the Counties of Dufferin, Grey, Bruce and Huron. From a study of its life history it is very probable that the early varieties will not suffer much from the pest, as the larvæ do not appear before the middle of July.

As to the pea-weevil, its ravages are of such great importance that the general adoption of fumigation by carbon bisulphide after harvesting might with much good reason be insisted upon by the Government.

The Clover Root Borer (Hylesinus trifolii), Fig. 27, destroyed many clover crops this year in the vicinity of Belleville. F. R. Marshall, a recent graduate of the College, writes thus: "In early and middle June it was apparent that the red clover was not blossoming properly. Many plants did not blossom at all; many others produced imperfect heads. In fields where the clover was two years old, every plant was affected. In one year old clover a smaller proportion of the plants was injured, but since then the effects of the insect are noticeable all over the field.

I have not found any alsike clover affected. There were some Lucerne plants in the field, but they are not at all damaged.

Until July 12th, I found nothing but adults. On that date I found several larvæ, some well grown which were all in the lower portions of the root, and the beetles up near the crown. There were from 2 to 7 larvæ in a single root and 2 to 4 beetles.

On Aug. 8th, there were still many larvæ; some pupæ, and few adults.

On Sept. 5th, there were some larvae and many adults; the adults being in the lower portions of the root and very inactive.

Stored Grain frequently suffer from the depredations of certain moths and beetles. of which the *Granary Beetle* (Calandra granaria) is perhaps the most troublesome. It is a small brown snout beetle which punctures the outer shell in which she deposits her eggs. The young footless grubs eat the inside of the kernel, and in about six weeks from the time the eggs are deposited the adults appear.

The Saw-Toothed Grain Beetle (Silvanus surinamensis) is occasionally quite a pest. Just lately I received a package of wheat, from a farm near Waterdown, which had been stored, and which was very badly infested with both this beetle and the *Cadelle* (Tenebroides mauritanicus). According to some authorities it is supposed that the *Cadelle* is beneficial rather than harmful, as it preys upon the other pests.

ASPARAGUS BEETLES.

By W. N. Hutt, B.S.A., Southend.

Beetles were first noticed May 8th on the second or third cutting of asparagus (two species—one red with dark spots, the other steel blue with light spots). Little attention was given to the insects as they were not numerous and did not seem to eat the stalks at all. The red species was most commonly seen, the blue beetles being comparatively scarce. In a few days the dark elongated eggs were found in scattered patches on the small spindling stalks which were not cut. There were about 12 to 20 eggs in a patch. In a few days the eggs hatched and small dark larvæ resembling the pear slug appeared. They grew rapidly, eating the soft tissue just back of the growing points. On approaching them the larvæ have a peculiar habit of raising their heads and excreting a dark viscid fluid.

At the ends of the plantation adjoining a sod headland, the beetles were found to be much more numerous, owing undoubtedly to the fact that in the sod their pupæ had been undisturbed by cultivation. Here the larvæ attacked the large and marketable shoots and rendered them worthless by eating off the green portions behind the growing point and smearing them over with slimy castings.

After this the beetles were, during each cutting of asparagus, picked off and destroyed and all small and spindling stalks cut away so as to leave no harbor for the larvæ. In this way the larvæ were kept in check but the beetles, in spite of the most careful hand-picking seemed rather to increase.

About the middle of June cutting was discontinued and the whole bed, rows and all, cultivated up deeply with a large field cultivator. All stalks were then allowed to grow and in a couple of weeks there was a growth of between three and four feet in height. No attention was given to the insects as it was thought their time of doing damage had passed and that the plantation had top enough to suffer no injury. In the third week of July however it was found that a new brood of larvæ had developed and was working vigorously at the tops of nearly all the plants. They worked from the growing point downward, eating all the green portions as they went. On July 31st the whole plantation was thoroughly sprayed, using 4 oz. Paris green to 50 gallons of water, with 2 or 3 lbs. of lime to act as a fixitive. For a few days after many slugs could be found and it was thought that the spraying had not been very successful. However, in a week or so as the insects worked down they came in contact with the poison and were killed. As the summer was very dry this mixture stayed on all season and further damage from the insects was entirely stopped.

In some unsprayed plantations which I observed, the insects stripped the plants till they looked as white and bleached as they would in the depths of winter. I heard some gardeners remarking how the drougth had withered up the asparagus and they could not believe that it had been eaten off by an insect. Some plantations where the insects were at work showed a distinct line of demarcation between the deadened tops eaten off by the slugs and the green portion below that was not yet reached.

The broods of the insect seem to be very numerous and to overlap one another so that eggs, larvæ and beetles may be found any time during the summer. The pupæ I have not found but I expect they are in the ground.

The destruction by the insect is very general owing to the gardeners not knowing the insect or seeing its destruction till their plantations had been stripped. A few odd beds, however, can be found where the beetles seem to have missed them.

I should judge that owing to the destruction of the green stalks and leaves the elaboration and storing up of nutriment in the crown for next year's crop would be seriously interfered with, and that next spring the owners of unsprayed plantations might expect a reduced crop and one composed of rather spindling stalks.

From my experience I think that the best remedial measures would be :

1. Frequent cultivation of the ground to disturb or destroy the insect in the pupa state.

2. The removal of all spindling stalks on which eggs might be deposited.

3. Thorough spraying after cutting has ceased.

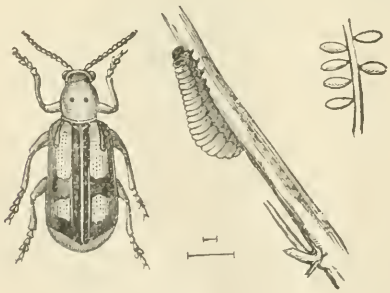


Fig. 28 (much magnified).

Fig. 29 (greatly magnified.)

These asparagus beetles are new to Canada and proved to be *Crioceris asparagi*, Linn (Fig. 28), and *C. 12 punctatus*, Linn. (Fig. 29). The latter species was the most numerous.

Prof. Webster said that it was remarkable that this insect, the twelve-spotted beetle, should have overtaken *C. asparagi*, which started for the east on its march across the country many years earlier, both being emigrants from Europe. He had observed that insects of this kind spread more rapidly westward south of the lakes than farther north The asparagus beetle had been found in south west Michigan by Mr. Pettit, but he had not been able to trace it west of Sandusky in Ohio. The twelve spotted species had reached Buffalo. He mentioned also the almost total disappearance of the Harlequin Cabbage Bug (*Strachia histrionica*) in Ohio this year. Last year it was very abundant but its numbers had apparently been greatly reduced by the severe winter.

FATAL BITE OF AN INSECT.

By Rev. C. J. S. Bethune, London.

During the past summer paragraphs appeared repeatedly in newspapers all over North America giving alarming accounts of the attacks of some marvellous insect upon the human person. The creature was called "the Kissing Bug" in consequence of its alleged habit of biting or stinging the lips of its sleeping victim and causing very painful if not fatal results. Much distress was caused among timid and nervous people and every unfamiliar insect, especially if large or ugly, was regarded as a specimen of the dreaded creature. Specimens of perfectly harmless insects (a *Cicada* for instance) were sent to the writer from various parts of Ontario with the expectation that they were veritable "kissing bugs" and he was enabled to allay these groundless fears in several quarters. Every entomologist had a similar experience and a list of the insects sent in on the supposition that they were representatives of the foe would be a long and amusing one.

On the first of September the following paragraph appeared in some Toronto papers and was speedily copied by a number of newspapers throughout Ontario:

"Kissing Bug's Bite Fatal.—Uxbridge, Aug. 31.—Roy Stevenson, the four-year-old son of Mr. George Stevenson, carpenter, of Udora, was bitten on the calf of the leg by a kissing bug on Thursday last. Dr. McDermott was called, but despite his best efforts blood-poisoning set in and the child died last night."

Here at last was a definite case with locality, names and date. I accordingly wrote to Dr. McDermott, whose address is Sunderland, Ont., asking whether the statements in the paragraph were correct, and if so, for a loan of the specimen in order that it might be identified. He very kindly replied as follows: "I will pack and send the insect as requested for identification. The boy died five days after being bitten. The part bitten was very painful from the first and the symptoms all through his illness were those of profound blood-poisoning. The little fellow was in good health when bitten and killed the insect immediately after it stung or bit him. His mother kept it rolled up in paper and gave it to me. It was bruised and damaged badly; you will notice that the legs are broken and most of them gone and one wing is in the bottom of the box. It was over five-eighths of an inch in length but has dried and shrunk greatly. I may say the case is clear against the insect, whatever it is, as its bite was the direct cause of the boy's death." Some days later the doctor sent me the specimen and added: "We have not pronounced it 'the Kissing Bug,' and do not know what it is. It bit the boy under the left knee and the leg became very painful and swollen. He died from profound blood-poisoning on the fifth day. He was in good health previously."

Fig. 30

With the assistance of Mr. Moffatt and the Society's collection, the insect though somewhat damaged, was identified as a specimen of *Sinea diadema*, Fab., which is the same as *Sinea multispinosa*, Am. and Serv. and *Reduvius raptatorius*, Say, who figures it in his "Entomology" (Le Conte's edition, vol. 1, plate 31; description p. 72, and vol. II, p. 249). It is a true bug of the order Hemiptera and family Reduviidæ, called "Assassin bugs" by Prof. Comstock from their habit of preying upon other insects. (Fig. 30.)

The specimen before us is a long narrow insect, dull brown in colour; the head is very long in proportion to the body, and much narrower, with a series of spines above; there are also numerous short blunt spines on the thorax, and a double series of sharp spines on the underside of the front pair of legs; the beak, with which it punctures its victims and sucks their blood, is long, three-jointed, and when not in use bent under the head, its tip resting in a groove between the fore-legs; these legs are very long, and adapted for seizing and holding its prey.

This Reduvius is a well-known insect, and is usually classed among the beneficial species from its habit of preying upon other insects, for the most part of an injurious character. It requires to be carefully handled, however, as it is quite ready to defend itself and inflict painful stings with its beak. Mr. J. Alston Moffat relates that on one occasion, some years ago, he captured a specimen, and held it between his finger and thumb, while with the other hand he searched for a pin. During the interval the bug took the opportunity of doing what it could in its own defence. Throwing its head well back it released its beak from the socket, and then forced it into Mr. Moffat's finger; not content with one puncture, it continued to draw back its head, and then force the beak down again into the wound, causing intense pain, until its human victim was able to get rid of it. He says that it was the severest sting he ever experienced during his many years of collecting; the pain extended up his arm, which became swollen to the elbow, and continued to be painful all night, while the wound on the finger did not disappear for several weeks. It is not likely that the insect injects any poison through its beak, as is done by the fang of a venomous serpent, but probably there remains adhering to it some of the juices of its previous victim—grub, caterpillar or what not—which have become decomposed, and thus poisonous to the blood. In this way we may account for the fatal effects of the puncture in the case of the child at Udora. As this is a rare, if not a unique, instance, the public generally need not feel any uneasiness regarding the so-called "kissing bug," and may rest assured that they are not liable to any new attacks upon their persons by venomous insects of a novel and malignant kind.

Dr. Fletcher said that the scratch of a pin has been known to induce blood-poisoning under certain circumstances, and it might well be that this bug's bite would only be serious after it had been feeding on some decomposed animal matter. Some years ago it was reported that a man was stung by an insect when working in nightsoil, and died from blood-poisoning shortly afterwards.

Mr. Moffat understood that the use of poison by insects was for the purpose of stupefying their prey so that they might feed in safety. He had observed these insects in contest with flies as large as a bumblebee, which could not be controlled unless stupefied.

Prof. Webster said that the bite of one Hemipteron, *Melanolestes picipes*, was very severe. He had experienced it once from a bug that he held in his hand, and was not likely to forget it, the pain was so great.

Dr. Bethune mentioned that Dr. Cowdry, one of the original members of the Society, told him that many years ago in England he had been hastily summoned to attend a brewer's carter, who had been stung on the lip by a large hornet. The patient

was a very stout man, who had evidently lived largely upon beer; blood-poisoning set in, and the man died the same night. A few years ago at the famous Johns Hopkins hospital, Baltimore, a boy was brought in suffering from the effects of a mosquito bite; every effort was made for his relief, but without success and he died shortly afterwards. These cases serve to show that the condition of the patient must often have much to do with the effects of the stings or bites of insects.

REMARKS UPON SOME CUBAN INSECTS.

By J. Alston Moffat, London, Ont.

On May 3rd, 1899, I received the following letter, which proved to be the introduction to a much valued correspondence; and the package containing the wasps referred to in it, was but the first of a series from the same source, containing numerous interesting examples of Cuban entomology, which have formed quite a valuable addition to the Society's exotic collection.

Santiago de Cuba, March 17th, 1899.

Entomological Society of Ontario.

Gentlemen;—I am sending you under separate cover a few specimens of wasps, which have a kind of root growing from them. I send you these to tell you of the belief here among the natives that the "Llana" a bush full of thorns has its origin from dead wasps. This affair was explained to me by Dr. Gundlach as being simply a fungus growth; it is quite acommon thing to find in the dry season, about February, a whole nest of these iusects on the ground, all of which have these roots. I have also seen them with the leaf—always dry—on the roots. The specimens I send you are not very good, they only having one root each, but I have not at present any better ones, and as the rains have already begun I shall not be able to get any more till next dry season.

I might also mention that the Tarantula or "Arana Peluda" as it is called here, is supposed to give birth to the "Sarza" a vine with some very sharp thorns.

It is rather interesting to notice how the natives connect the sting of these insects with the thorns of the plants, and they will not be convinced that they are wrong.

I hope this may be of interest to you. I have never seen the Tarantula with the roots, but shall keep a lookout for them next season, and may be able to send you a specimen.

Yours truly,

Chas. T. Ramsden.

A few days later the box came to hand with the specimens in fairly good condition; the fungus growths projecting from them conspicuously. The wasps are of medium size, exquisitely formed and beautifully ornamented in brown, black and yellow, but the colors lose much of their brightness when the insects are dried.

My first consideration was to obtain the name of the species, and for that purpose I sent an example to Prof. W. H. Ashmead, of the United States National Museum, Washington, D. C., who kindly and promptly forwarded to me the following letter in reply to my inquiry:

SMITHSONIAN INSTITUTION, UNITED STATES NATIONAL MUSEUM.

May 18th, 1899.

DEAR SIR:—Your favor of the 8th inst., together with the wasp came promptly to hand. The specimen you sent me is the male of *Polistes lineatus* Fabr. a species widely distributed throughout the West Indies and South America. By some it is considered only a variety of *crinitus* Felton, but so far as I can see it is a good species and ought to be kept separated.

Yours very truly,

WM. H. ASHMEAD.

FIG. 31—White grub fungus *Cordyceps melolonthæ*.

Vegetal parasitism, in one form or another is not an unusual occurrence in insect life. The Silk Industry of France was at one time threatened with complete destruction, by a form of it attacking the Mulberry Silk-worm, *Bombyxmori*. Illustrations of the effect of one form may be seen in specimens of our common housefly. Another form is known as the white-grub fungus; this white grub being the larval stage of the common May-beetle, *Lachnosterna* Sp. An interesting account of that form is given in the "American Entomologist," Vol. 1, page 92. In a letter from Mr. S. H. Y. Early given there, I quote the following particulars. "In the spring of 1842 I observed in what is called "New Ground" in Virginia a great quantity of these mushrooms, and in reply to some remarks I made about them, some of my father's negroes who were then making hills with hoes for planting tobacco, enquired of me if I knew what produced these mushrooms. On my replying in the negative, I was informed that they grew from the white grub worm (Fig. 31). I think there were some twelve or fifteen negroes present, all of whom concurred in the statement, and said it was no new thing to them. They had no difficulty in establishing the truth of what they stated, because they dug them up in all their stages of germination and growth before my eyes. In a very short time they had furnished me with a large number of the worms in their original shape, features and size, and as distinct to the eyes as if they had been alive, but having the consistency, color and smell of a mushroom; and I actually broke them up, just as a mushroom breaks in one's hands, snapping them crosswise and squarely off." At one time it was hoped that this fungus disease might be propagated at pleasure, for the destruction of the white grub in meadows, but so far it has not proved to be practical.

One can easily conceive of fungus spores vegetating on the soft body of a grub, but it is difficult to understand how they could obtain a foothold on the hard chitinous covering of these wasps. In another letter Mr. Ramsden informed me that they suspend their nests on a branch of a bush, so they cannot be specially exposed to contact with moisture; and yet they seem to be specially liable to this fungus attack, as shown by the following quotation from the paper previously mentioned: "According to Dr. Carpenter, it is not at all unusual in the West Indies to see wasps (genus *Polistes*) flying about with plants of their own length, projecting from their bodies." And again, in "The American Entomologist," vol. 3, page 138, when speaking of the species of fungus of the genus *Torrubia* which affects the white grub, Prof. Riley said "We have in our cabinet some interesting specimens of this stage affecting wasps of the genus *Polistes*, originating just as the White grub fungus does, from the base of the mandibles." In those received from Mr. Ramsden, the fungus had its origin in the immediate vicinity of the front pair of legs. With regard to the scientific name of the fungus affecting the wasps, Mr. Dearness did not find any of them

in a sufficiently advanced stage to enable him to determine it, and Prof. Riley said : "It is never safe to assume the identity of a fungus of this character unless it can be studied when mature, especially as there are at least a couple of dozen species of *Torrubia* known to inhabit insects." Mr. Ramsden informed me, that as the wet season had set in, he would not be able to get any more for some time.

Amongst other material received from Mr. Ramsden, was a pair of that occasional visitor to this locality, *Dilophonota ello*, Fab. belonging to the Sphingidae. He had taken the caterpillars in large numbers, feeding on a plant familiarly known there as "Lechero." Some were of a reddish-purple color, but the majority were green. He quoted Gundlach as saying they were destructive to the yucca crops in Cuba, they are also found on the papaya (Carica papaya), but there is a parasite that attacks the larva, *Microgaster flaviventris*, which keeps them in check. Mr. Ramsden bred a *dipteron* from his pupæ, specimens of which he sent to me, but it has not yet been determined.

Also three specimens of *Chloridea virescens*, Fab. which he had bred from larva taken on Tobacco plants. Mr. Ramsden quoted from Dr. Gundlach's "Entomologia Cubana," the following about the larva of *virescens* : "Some were placed in a cage together with some of *Danais* ; Virescens attacked and ate the latter, also eating each other ; and some he held in his hand bit him." The border of the hind wings of the moth is usually blackish, but in one of those received from Mr. Ramsden the border was beautifully tinged with red. Mr Bice took a single specimen of this southern insect in London at light in the season of 1896.

Of things received from Cuba, and occasionally taken in Canada, were specimens of *Terias nicippe*, *Eudioptis hyalinata* and what appeared to be *Junonia coenia*.

Mr. Ramsden sent for identification and to be returned, as it was his first and only specimen of a rare insect, which he had taken at light, a most singular looking creature. At first glance it suggested a butterfly and Dragonfly combined, as if made up for the purpose of deception. It had conspicuously stout antennae, about an inch and a quarter long, and heavily knobbed at the end, resembling those of a butterfly, with the long, narrow, and clear reticulated wings of a dragonfly. Upon close examination and comparison I was convinced that it belonged to the Ant-lions, and through the good office of Dr. Bethune I was enabled to send to him the generic name of the creature. The Doctor called my attention to Westwood's Introduction to the Modern Classification of Insects, vol. 2, p. 41, on the Order Neuroptera, Family Myrmeleonidæ, where there is a cut showing stages and parts of a variety of species, and amongst the parts is an antenna corresponding exactly to those of Mr. Ramsden's specimen, and on page 45, Prof. Westwood referring to the figure says : "The genus *Ascalaphus*, Fab. is remarkable for the peculiar structure of its antennæ, which are very long and knobbed like those of a butterfly, (fig. 63, 21.), whence Scapoli and others described one of those insects as a Papilio." I see by the Eleventh Report of the N Y. State Entomologist, page 239, that there are six species of *Ascalaphinæ* listed by Banks as occurring in the United States ; five are southern forms, and one is found as far north as Massachusetts. It is supposed that the larvæ of this genus do not make pitfalls. Several observations have been reported of the females depositing their eggs on twigs of trees and blades of grass, and that the young lie in wait under sticks and stones to seize their prey. An instance is given of a Ceylonese species, *Ascalaphus insimulans* that makes no pitfalls. "Some young ones were found ranged in a single row along the stem of a lily with the abdomen of each covered by the one behind it, and with their jaws widely extended : in this manner they waited for their prey to literally walk into their jaws." Reference is made to some interesting notes published by Prof. Westwood in the *Transactions of the Entomological Society of London*, 1888, concerning this genus. It was a great pleasure to have the opportunity of looking at so strange a creature, and it would be yet more gratifying to be in possession of one.

THE WING STRUCTURE OF A BUTTERFLY.

By J. Alston Moffat, London, Ont.

Anosia Archippus, Fab. is, according to Dr. Buckell, of London, England, who gave much time and careful consideration to the investigation of this much disputed subject, the correct scientific name of our common milkweed butterfly, which, after several years of comparative scarcity in this locality, again appeared in great abundance during the season of 1899.

There are several questions yet unsettled by entomologists concerning the life history of this most noticeable, and usually one of the commonest of our butterflies, that require clearing up, and which tend to throw a halo of mystery around this familiar insect, which gives it special interest in the eyes of all who take delight in observing the ways and works of living objects in nature around them. Some things concerning it have been fully established ; for instance, it is now a well known fact that *Anosia Archippus* cannot survive the winter, in any stage of its existence, in Ontario or northward of it. That each recurring winter sweeps our country clear of this particular species, and it has to be restocked every spring by immigrants from the south ; just how far south of our Dominion it has to go before it can live through the winter has not yet been satisfactorily settled. That it migrates southward in the autumn in immense bodies, sometimes numbering millions, is well known, and has been frequently observed ; therefore it must return in the spring, but by scattered individuals, to take up the territory it vacated in the fall. Dr. Scudder says it belongs to a distinctively tropical group of butterflies, and that north of Philadelphia it clearly appears like an interloper. He also claims that it is a long lived insect ; that a female starting northward may travel for weeks, depositing her eggs as she goes, a few at a time, until she reaches the northern limit to the growth of its food plant *Asclepias*. Dr. Scudder also holds that no *Archippus* born northward ever lays eggs the same season.

Mr. W. H. Edwards says that there are three or more broods in the season of *A. Archippus* in Virginia, and he does not consider it to be an unusually long lived butterfly ; which caused him to remark that if it had such a lengthened period of existence in the mature state as Dr. Scudder claimed for it, then instead of giving it the common name of " The Monarch," a more appropriate name for it would be the " The Patriarch." Prof. Riley's idea was that fertile females of the hybernating groups in the south started northward in the early spring, when the milkweeds were ready to receive their ova, and would travel some distance before they had finished ovipositing, when these would naturally perish ; then their progeny would continue to advance and carry on the work of producing ova to stock the milkweeds as they come on in the north. Thus, there might be several broods required in a season to reach the northern limits of its food plant. I have not yet formed any decided opinion upon these different views, for as much observation and consideration as I have given to the subject, some of my observations sustaining one side, and some as strongly supporting the other.

The wonderful power for sustained flight over long distances of Anosia Archippus is now well substantiated ; individuals having been frequently seen at sea hundreds of miles away from land. That a longer term of life in the mature state than is allotted to butterflies generally, to enable it to fulfil its seasonal functions seems to be required ; for if the same individuals that leave the north about the end of August or beginning of September pass the winter in the south, and then return northward in the early spring to deposit their eggs for the summer's brood, it would give them a much longer active life in the mature state than falls to the lot of butterflies that hybernate in this region. Whether any of those passing the winter in the south, reach the far north the following season is yet open to question.

I have seen specimens arrive in the spring in a sorely faded condition, indicating age and exposure to the weather, followed by others that were comparatively fresh, as if they were younger and less travel-stained than the first. Then again, I have seen the first arrivals in fairly good condition, as if they had not been long upon the wing. Such observations start the questions : were any of these specimens hybernators from the south,

or were they the progeny of hybernators? Then from how far south had they come? Again I have seen specimens haunting a particular locality for weeks, and as far as I could judge by their gradually fading colors they were the same individuals; had these permanently settled down in that locality, to go no further north? Again, I have seen them flying plentifully for six or eight days and then begin to pair; indicating that these particular individuals had not laid eggs before reaching that locality. I have seen fresh-looking specimens flying at the time the new brood was emerging from the chrysalis, and so fresh as to give rise to a difference of opinion, as to whether they were previous arrivals or bred on the spot? I have seen quite small caterpillars on the milkweeds when others had passed into the mature state; all of which have convinced me that there is more than one wave of migration northward during the breeding season.

These statements prove nothing, but they will help to indicate where the missing links are situated, which yet require to be forged to complete the chain of the life history of this particularly interesting creature; and will serve as a guide to those who are inclined and have the opportunity, to continue the observations, and make the evidence positive rather than presumptive.

Ever since the season of 1894, when I first discovered that the upper and under membranes of a butterfly's wing could be separated from each other, my desire has been to make further investigations in the matter, so as to prove or disprove what I thought I learned at that time. Then with the appearance in abundance of *Anosia Archippus* in the early season of 1899 I fondly hoped that my opportunity had arrived. The first one I saw was about the middle of May, in an unusually battered condition, and from that on until about the end of June they kept increasing in numbers, till they were to be met with everywhere. I requested friends to endeavour to secure for me a number of nearly full-fed caterpillars from the milk weed, so that I might have plenty of material with which to prosecute my investigations. Mr. Balkwill was the first to respond, on the 22nd of July, with a newly transformed chrysalid and several large caterpillars, which were followed by more from the janitor of the Y.M.C.A. Then I made a trip on the street car to a common in the vicinity of his residence, where *Asclepias cornuti* was growing in profusion, and I secured yet more, so that before the first had emerged I was in possession of fourteen pupæ, and Mr. Balkwill added four more to the stock subsequently, and they were all required.

The great advantage in procuring this particular species for such an investigation is not so much on account of its numbers in an abundant year, or the ease with which it can be fed up, but in the character of its crysalid, which is a pale translucent green, whilst the butterfly is a bright brown with black veins and white spots. These colors when the pupa is approaching its crisis show through the thin transparent pupa-case, which gives one an opportunity of clearly observing the progress it is making towards maturity, when it can be arrested at any stage desired; or, with a little practice, one can tell within a few minutes of the time when it will burst its bonds, and so obtain warning to be on hand to witness its disclosure and development, and then secure it in the proper condition, for the purpose intended.

I was surprised at the amount of mortality there was amongst the caterpillars after suspension; although I had been prepared to expect something of the sort from reading the chapter on "The critical periods of it's life" in Dr. Scudder's book, "The Life of a Butterfly." But there is no intimation given therein of the disease that afflicted my stock; which manifested itself by the caterpillar becoming flaccid, the skin opening and fluid escaping and forming long silky threads. If one of them hung its head straight down I knew it was doomed, and the other symptoms soon followed. It extended to some of the chrysalids. There were no indications of parasitism in my lot. The time from the formation of the pupa to the emerging of the imago was ten to fourteen days. In no instance did any that I saw emerge drop from the pupa case to cause it to expand its wings suddenly. They came out of their case apparently with great caution and deliberation; and it took them from ten to fifteen minutes to fully expand their wings. The temperature of the weather through nearly all the period of their emergence was on the cool side, especially the nights, which would tend in some measure to restrain their energies.

It would be profitless to relate the difficulties I had to encounter in the prosecution of my investigations; and how I had to gain my information for success through failures in my efforts to accomplish the object in view; but it may be of use to anyone who wants to prosecute the enquiry to know what I earned during the process.

For the examination of an unexpanded wing, the chrysalid should be allowed to mature as nearly as possible to the point of emerging before it is killed, which I did by placing it in alcohol; then it is the better to hang for twelve hours for some of the moisture to evaporate. For the comfortable handling of an expanded wing, after full development it should be allowed to obtain complete firmness, which may take an hour or two, before killing the insect and separating the wing from the thorax. The only place that I could find an entrance for a pin point between the membranes, was at the base of the wing, where the subcostal and median veins come close together; when once the pin has entered, either in a vein or between the two, it can be moved back and forth through the entire width of the wing without encountering the slightest obstruction. The upper and under membranes of the wings are at the front and hind edges all in one piece, and must be cut to get them apart, which can be done by running the pin down through them, and so delicate are they, that this can be done without feeling that any extra pressure is required. Because of that extreme tenderness I had some difficulty in obtaining conclusive evidence as to the actual structure of the outer angle of the wings, until I bethought me of getting water between the membranes. With great care, after many trials, I succeeded in inserting a fine glass tube at the base of a wing, and soon had water flowing into it. Resting the wing on the surface of a tumbler of water, it soon rounded out like a bladder; but as soon as the water touched the outer angle the bladder collapsed, all the water having gone together, and the membranes were as before it entered. This sac will not hold water, the membranes being finished and fringed independently of each other at the outer angles.

The greatest difficulty in getting the membranes separated, and in getting them to stay apart arises from the gummy nature of the fluid that has entered between them from the thorax. If one separates a part of the wing and lets it go again, the sides are instantly as closely united as they were at first: or if a portion of the membrane folds in upon itself, one is far more likely to tear it than turn it back, in their efforts to straighten it. My available material had become reduced to three chrysalids, and I had not then obtained a perfect example, and was beginning to wonder if the effort was to prove a complete failure, when I thought of trying to separate them under water, and found it to work admirably. I could then separate the membranes without difficulty or danger; when separated I floated each half on to a bit of oiled paper, transferred them to blotting paper with their outsides next to it, then allowed some of the superfluous moisture to evaporate before covering them and putting them under pressure to thoroughly dry, when they came out in perfect condition.

The fluid which had been stored up in the thorax of the pupa flows in between the membranes of the wings at the opening by the subcostal and median veins, passing along and expanding them as it goes until the wings have attained their full dimensions; the fluid as it dries becomes more gummy and adhesive, and when perfectly dry the butterfly's wing with which we are all familiar is completed. The veins and nervures are situated half in one membrane and half in the other, the heaviest portion being in the upper membrane and open in the centre; so there is every reason to believe that the fluid does pass into, and through between them as it does between the membranes, but when it dries it forms such a thin coating on their inner sides that it practically leaves them empty. Then when the fluid has quite dried it has cemented the two halves together, which form the hollow tube that has been the subject of so much discussion; whilst at the same time it tends to stiffen and strengthen them as it does the membrane. Here I have the opportunity of correcting myself in a statement I made of what I thought I saw in an unexpanded wing. Twenty-fifth Annual Report of the Entomological Society of Ontario, page 65, where I state that "The nervures are in the upper membrane, with a groove in the lower opposite, into which they fit." That appearance I found frequently produced, by the walls of the larger veins in the upper membrane clos

ing together on the inner side; but their true structure can be clearly demonstrated in an unexpanded wing. And here I will express the opinion that the term "veins" is inappropriate and quite misleading as to their purpose and use.

The most recent statement upon this subject that has come under my notice is in an article by Henry Charles Lang, M.D., M.R.C.S., L.R.C.P., London, England, in the August number of *Science Gossip*, 1899, page 71, from which I will copy the paragraph headed, "The Vascular System:"

"This in butterflies is of a very simple character. The centre of the circulation is a rudimentary heart called the 'dorsal vessel,' situated on the dorsal surface of the abdomen and divided into several chambers. It is controlled by muscles attached to the abdominal walls, and by their action the blood is propelled into the aorta, which is a prolongation of the dorsal vessel, having the form of a tube passing through the thorax to the head. The blood then returns through the lacunae or interspaces of the various organs to the abdominal sinus which surrounds the dorsal vessel and thence into the vessel itself through special valvular openings. There are, in insects, neither arteries, capillaries, nor veins in the true sense of the word, and the blood is cold, colorless and not corpusculated. As above stated, it is usually held that in butterflies *the nervures of the wings convey the blood to these appendages*, until they are fully unfolded after the emergence of the insect from the pupa. Circulation through these then ceases, the texture of the wings becoming dry and nonvascular. The nervures then perform the functions of air tubes." The italics are mine, and what I desire to call attention to is, that it is now time to cease disseminating that bit of misinformation. We have now attained to a fairly clear conception of the wing structure of this particular butterfly, and the question now to be settled is, are all butterflies' wings constructed on the same principle? It seems highly probable that they are, but positive proof is wanted; and I now consider it an easy matter to get it by anyone who can obtain a specimen in the proper condition. And as an inducement for anyone inclined to follow up the subject, I would recommend it to them as a most fascinating field of observation, and one well calculated to yield profitable results.

The photograph for the plate prefixed to this volume, was taken by Mr. R. W. Rennie, London, Ont., who, amongst his other accomplishments, is an expert amateur photographer.

Description of the Plate.

Fig. 1. Presents the inner sides of upper and lower membranes of a front and hind wing. These were separated under water and the gummy fluid washed off so the color of the outer surface shines through.

Fig. 2. The inner side of the lower membrane of a front wing.

Fig. 3. The hind wing of a male, disclosing the inside of the sexual spot.

Fig. 4. The inner side of an upper membrane of a front wing.

Fig. 5. The inner side of the lower membrane of a female's wing. These four membranes were separated as best I could before I tried it in water, the gummy fluid over the whole inner face of the membrane giving them a whitish appearance, as if they had got a thin coat of varnish.

Fig. 6. Shows the inner sides of the two membranes of an unexpanded front wing, with the basal portion of the costal membrane not separated. Its exact length is five-eighths of an inch.

Fig. 7. Gives a view of the natural size of a perfect front winglet. The opposite one is incomplete.

Fig. 8. The underside of a hind winglet. The opposite one is the upper side of another; both imperfect.

Fig. 9-10. Are the wings of one butterfly. The length of front wings from base to apex is two inches, by one and a quarter wide at the outer angle.

Upon one occasion, when engaged in separating some of the membranes, the inner sides of which, upon being exposed to view, had a reddish, raw appearance, a friend who had been intently watching the operation for a time, turned away with the remark, "Well, it's got down to a pretty fine thing now, when you've taken to skinning them!"

NATURE-STUDY LESSONS ON THE CABBAGE BUTTERFLY.

(*Pieris rapae.*)

By Prof. W. Lochhead, Ontario Agricultural College, Guelph.

Introductory Note. The purpose of the following Nature-study Lessons on the Cabbage Butterfly is to furnish information and question hints, regarding the structure and life-history of one of the most common insects of our Province, to those teachers who would like to introduce Nature Study into their schools, but are prevented from doing so by a lack of knowledge of insect structure and habits.

Nearly all insects begin with the egg stage. From the egg emerges the *larva*, (called *maggot* in the case of flies, *caterpillar* in the case of moths and butterflies, *grubs* in the case of many beetles, and *nymph* in the case of grasshoppers, plant lice and half-winged insects.) The larva moults, or changes its skin, as it grows, the number of moults varying with the individual insect. The larva of the moths, butterflies, beetles, flies and wasps, on reaching its full growth transforms into a passive creature and sometimes spins a *cocoon* about itself, as in the moths; or becomes a *chrysalis*, as in the butterflies; or makes a case within which it may rest quietly as a *pupa*, as in the flies and wasps. The nymphs of the grasshoppers do not transform, but with each successive moult become more like the adult insects. The adult form is usually winged, and is known as the *imago*, in the case of the butterflies and moths.

Nature-study lessons must be very informal in their nature. Their object is to make children observe, and to draw proper conclusions from the observations; to make them see what they are looking at, and to arouse an interest in the world of nature about them.

True teachers will find that the best objects for Nature-study are the most common objects about them. For this reason the Cabbage Butterfly has been taken in this case, and it is the sincere hope of the writer of these lessons that many teachers will make at least a beginning of this work, and give these most informal studies a fair chance among the other studies of the school.

Reference is here made to an article by the writer, entitled "Entomology in Schools," published in the last annual report of the Ontario Entomological Society, 1898, in which the names of the most important works on insects are given.

Fig 33—The Female Cabbage Butterfly.

Every child knows the pretty white butterflies, which are so common in September in gardens and along roadsides. These flit about from flower to flower, evidently not caring much what kind they visit. The despised dandelion, the execrable blue-weed, the ubiquitous yarrow, the notorious thistle are each in turn visited for the sake of the nectar or honey they contain. But September is not the only month when these white butterflies (Figs. 32 and 33) are abroad. As soon as the snow has melted in March, many of them may be seen flying about, lured by the bright sunshine into leaving their comfortable winter quarters for the deceptive breezes of early spring. With a relapse to cold weather many a poor butterfly is frozen to death. Those that have been rendered only torpid the returning hot sun's rays bring back to life again.

From their appearance in spring till autumn there is not a month when they are entirely absent, for there are three broods during the summer, and many of the late ones of one brood will be found flying with the early ones of the succeeding brood.

Fig. 32.—The Male Butterfly.

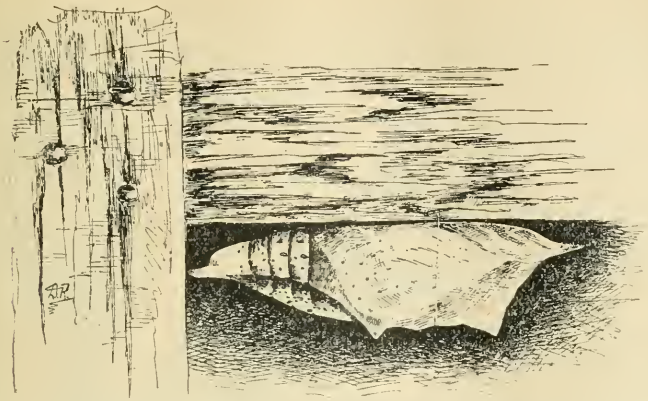
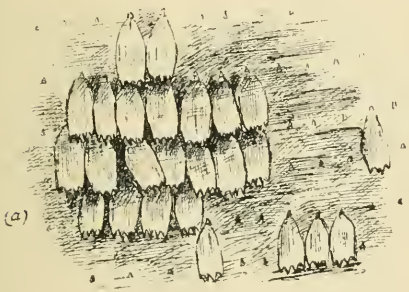


FIG. 34.—A Chrysalis of Cabbage Butterfly, showing the slender silken band by which it is slung up to the fence rail. The posterior end is attached to upright post in this case, but usually it is attached to the horizontal board. The projections of the wings, the legs and the coiled tongue are prominent.

(Fig. 34.) The cabbage butterfly winters over in the chrysalis state. A little search in late autumn will reveal many of these chrysalids suspended under the covering boards or rails of fences which enclose fields of turnip or rape. It will repay one to observe carefully, and make notes of, the peculiar shape of a chrysalis. It is about four-fifths of an inch long, and is generally of a light grey, or brown color. It is suspended at two points—at its pointed posterior end and at the middle of the body, by a silken cord that forms a band by means of which it is slung up tightly to the board or other object. The chrysalis case is quite thin and apparently brittle. The wings, coiled tongue, and legs can be fairly well recognized within the case. Every pupil should watch carefully the way the white butterflies emerge from chrysalids which have been collected.



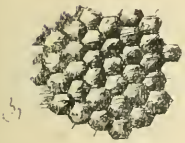


FIG. 35.—(*a*) A few scales on the wing, showing the shape of scales, their arrangement in rows, and overlapping, (much enlarged). (*b*) a portion of large eye, much enlarged, showing hexagonal facets.

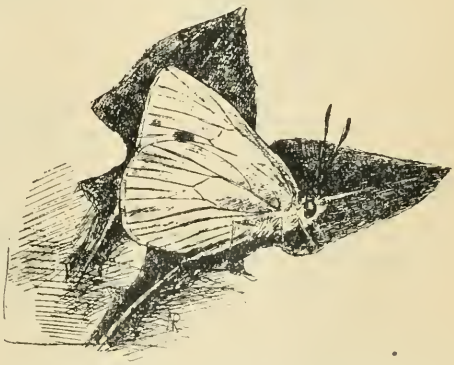


FIG. 36.—An Imago of Cabbage Butterfly at rest on a leaf, showing the wings folded over the back, the three pairs of legs, the prominent eyes, and the long club shaped antennae.

The white butterflies have six well-developed legs, and four wings covered with scales (Fig. 35, *a*) which brush off very readily. (Do all butterflies have six well-developed legs? Do all winged insects have scales on their wings?) If we examine several specimens we shall very likely find slight differences in the number of black spots on the fore wings. The female butterfly (Fig. 33) has two black spots while the male (Fig. 32) has only one. We shall notice also that when the butterfly is resting on a flower the wings are held erect, (Fig. 36). (Find scale-winged insects which fold their wings by their sides when at rest.)

The antennae or feelers are thread like, and club shaped at the ends. (Have all butterflies and moth similar feelers?) The eyes are quite prominent, and if they are examined with a strong lens a large number of facets (Fig 35, b) will be seen. Such eyes are said to be compound.

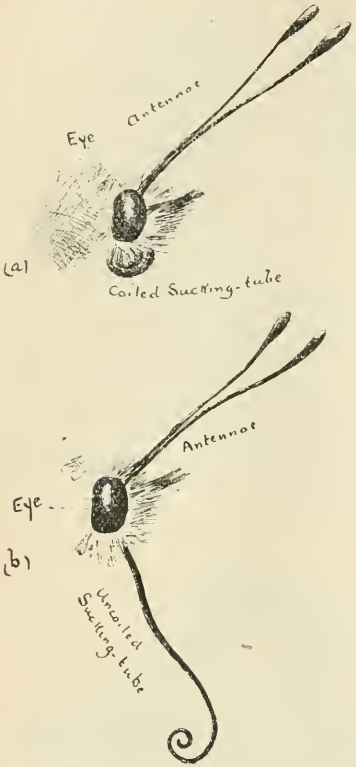


Fig. 37.— (a) Head of Cabbage butterfly, showing eye, long antennae and coiled sucking tube. (b) Head with sucking tube uncoiled.

Fig. 38.—A Cabbage Worm, showing the yellowish band along the back, the breathing pores, and yellowish dots along the sides, the three pairs of true legs in front, the five pairs of prop-legs behind, and the hairs and black dots on the back. (Somewhat magnified.)

Perhaps the most interesting structure of the butterfly is the long sucking tube which is usually coiled up like a watch spring, (Fig. 37, a). If we observe a butterfly while on a visit to a flower, we shall find that the sucking-tube is uncoiled (Fig. 37, b) and thrust into the corolla, and that the nectar is sucked by means of little muscles acting on a bulb or sac at the base of the tube. The process resembles that by which water is drawn up through a straw inserted in the mouth.

The eggs are laid by the female butterfly on the plant which serves as food for the caterpillar. Pupils should look on the underside of the leaves of cabbage, turnip, rape, mignonette, and other cruciferous plants for the pale yellow, flask-shaped, erect bodies, and examine carefully with a lens to find the vertical ribs on the eggs. The teacher should direct attention to the fact that the eggs are seldom placed in clusters but are somewhat scattered.

In about a week the tiny caterpillar comes out of the egg. (Note how long it takes to become full grown, and how often it moults). The color is green like its food-plant. All should examine carefully and find the yellowish band along the top of its back, the row of yellow spots along the sides and the fine black dots on its body. When full grown the caterpillar is nearly an inch in length. (Fig. 38). Then there are indications that another change is about to take place. (What are some of these indications? Where do you generally find the chrysalids?)

Very frequently in the autumn many cabbage-worms present a distended and sickly appearance. They are sluggish and have no desire to eat. If some of these worms be put in a box and taken to the house, where they can be observed frequently,

the cause for the sickness will soon become apparent. Small white maggots will bore their way out through the skin and congregate about the poor caterpillar as in Fig 39, *a*; and if these maggots be watched, it will be found that they soon begin to spin silken cocoons about their bodies (see Fig. 39, *b*.) The caterpillar has sometimes sufficient vitality left to crawl away from its tormentors an inch or two; but most frequently it dies beside them, and in a day or two no trace of its body can be found. If these cocoons be placed in a tin box for a few days, minute four-winged flies (Fig. 39, *d*) will emerge through a lid-like opening at the end of the cocoons. (Fig. 39, *c*.) These flies are parasites; they lay their eggs within the body of the cabbage-worms by inserting their needle-shaped ovipositors through the skin. In a short time the eggs hatch minute maggots, which grow and feed within the body of their host until they become full-grown, when they emerge as already described. It is very likely that the majority of cabbage worms suffer death through the agency of parasites. Even the chrysalids are not immune from the attacks of these parasites; for if many be examined, the interior of the case will in some instances be found filled with small maggots. Moreover the butter-fly is eaten by many birds and other animals; so we are foreed to conclude that the Cabbage fly has to contend with many enemies during its life-cycle (Fig. 40); that there

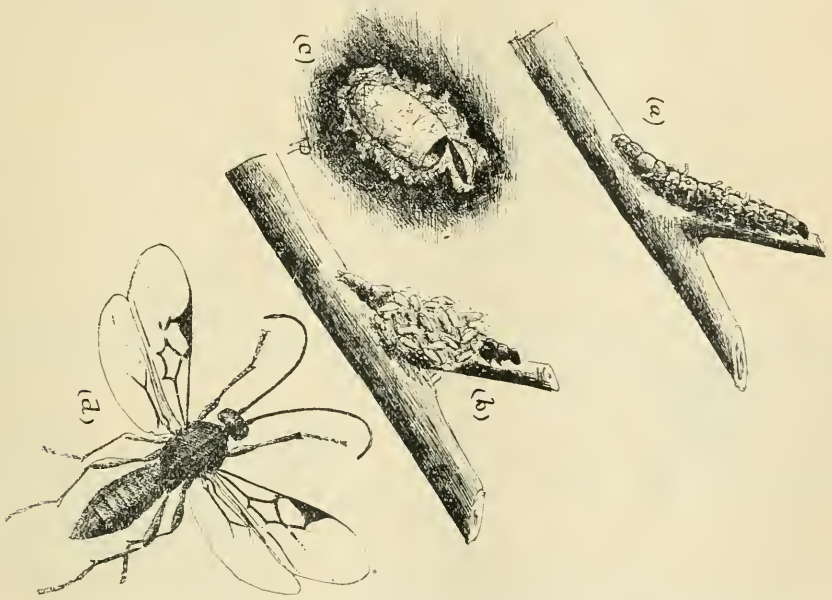


Fig. 39.—(*a*) Cabbage-worm with maggots escaping through the skin; (*b*) The maggots have transformed into pupae within cocoons; (*c*) One of the cream-colored cocoons with the lid-like opening; (*d*) The adult parasite fly which emerges from the cocoon, greatly magnified.

is a constant struggle for existence, and only a small fraction of the entire brood is left to propagate the species and to molest the farmer and gardener.

The respiratory or breathing apparatus of insects is rather peculiar. If a large Cabbage-worm be examined many openings may be seen along each side of the abdomen in the same line as the yellowish dots (Fig. 38.) These openings are the terminations of tubes which ramify through the body and supply air to the interior, so that an inter-change of gases can take place, and the blood be purified.

A good practical method of killing the Cabbage-worms is to dust a mixture of one pound of insect-powder and five pounds of flour through a cheese-cloth bag upon the infested plants. The fine powder of the mixture clogs the breathing pores, and prevents the access of air to the interior of the body, so that the worm is virtually suffocated.

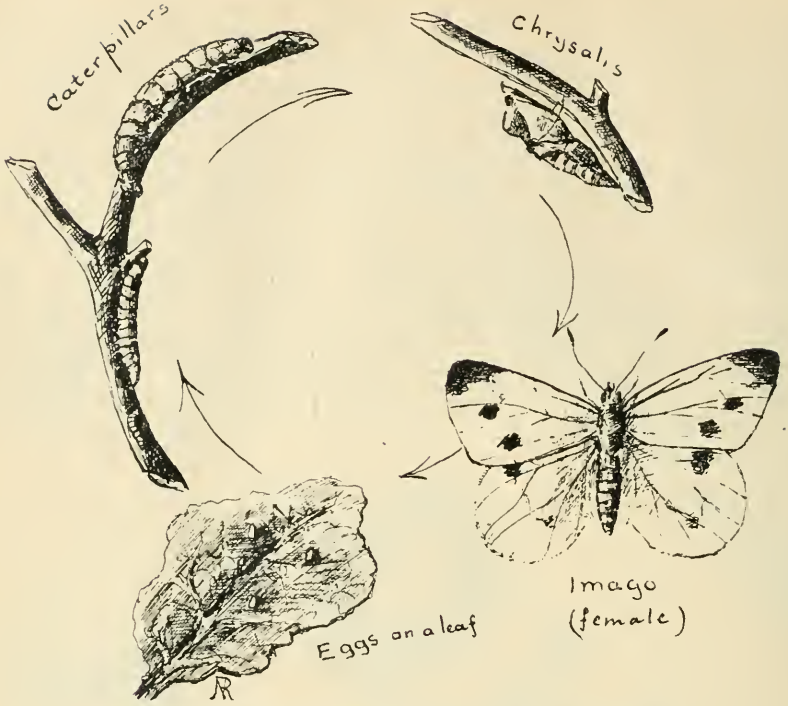


FIG. 40.—The four stages in the butterfly's life-history are represented, eggs, larvæ or caterpillars, chrysalis and imago.

FIG. 41.

The common Cabbage-butterfly is not a native of this Continent, but has been imported from Europe within recent years. It reached Quebec about 1860; in 1863 it was quite common about Quebec; in 1867 it was in Montreal; in 1868 it spread from New York where it had been introduced from Europe; by 1881 it had spread throughout the eastern half of Continent; by 1886 the Rocky Mountains had been reached; and now it roams from the Atlantic to the Pacific. It displaced the native species (Pieris protodice), Figs. 41, male, 42, female, driving it before it; bu after thirty-six years of occupation the same native form re-appears with renewed vigor, and gives signs of competing successfully with the intruder.

FIG. 42.

LESSON I.—THE EGGS

Leaves of cabbage, turnip, or rape with the eggs should be collected. On which side of the leaves are the eggs found? Of what advantage? What is the shape of the eggs? The color? What kind of an insect lays these eggs? What kind of creatures hatch from these eggs? Do they resemble the mother insect? How long before the eggs hatch? (It is important that the pupils should have the eggs under observation. If possible the study should be made on the objects in the fields, under natural conditions, but leaves might be brought into the class room).

Lesson II.—The Cabbage-worms.

A supply of cabbage-worms should be on hand, and if possible a piece of half-eaten leaf with the worm at work before each pupil.

1. Why are some of the worms larger than others
2. Describe the markings.
3. How many legs has the worm? Describe their location. Are all the legs of the same structure?
4. Describe how the worms eat.
5. What method of destroying the worms would be possible?
6. Watch carefully to find out how often a worm moults.
7. Follow closely the movements of a worm which has become full grown and has become restless.
8. Watch the large worms which have become sickly and have begun to change color, for the appearance of small white maggots. Where do these maggots come from? What change comes over the maggots?
9. Describe how a caterpillar breathes.
10. What would be the result if the breathing pores were plugged or stopped up?
11. Try the effect of spraying Paris Green water on some caterpillars. What objection is there to the use of Paris Green?
12. Dust some insect powder mixed with about five times as much fine ashes, through a cheese-cloth bag on some caterpillars, notice the effect.

Lesson III.—The Chrysalids.

A collection of chrysalids should be procured from the fences surrounding cabbage, turnip, and rape fields.

1. How are the chrysalids attached to the fence rails?
2. How long does this insect remain in the chrysalid condition?
3. Which surface of the chrysalid touches the surface of rest?
4. What signs of wings, etc., are to be seen?
5. Open some chrysalids to find if all are living.
6. In the dead chrysalids what do you find? How did the maggots get inside?
7. Locate accurately 25 chrysalids in the early winter; and in late winter, determine the number left. What has happened to those that have disappeared?
8. What then are some of the enemies?

Lesson IV.—The White Butterflies.

1. In what month did the first butterfly appear? If possible watch for its appearance.
2. When did the butterfly emerge from the chrysalid kept in a box in your room? Can you account for the difference in time?
3. Number of wings? Of legs? Number of parts to each leg?
4. How does the butterfly hold its wings when at rest.
5. What is the nature of its mouth? Can it eat? For what is its mouth adopted? Watch how a butterfly feeds.
6. Are the wings of all the white butterflies spotted alike? What does this difference indicate?
7. Has this butterfly any enemies? Name some.
8. Of what use are the scales on the wings?

Lesson V.—Other White Butterflies.

For this lesson the native Pierids should be shown the pupils. The differences should be seen. The teacher should then give the pupils a short history of the introduction of of this white butterfly to America, and its subsequent spread.

1. How would you distinguish the cabbage-butterfly from the *Gray-veined White and the Checkered-White*?
2. Collect caterpillars of each species, and learn to distinguish them.
3. Upon what plants does the caterpillar of the *Yellow*, or Clouded Sulphur Butterfly feed.

SPIDERS.

By Rev. Thomas W. Fyles, F.L.S., Levis, Quebec.

Spiders are not generally regarded as pleasant objects. I think most people have an antipathy to them. They dislike their appearance and their ways. At an entertainment given in a village that I know, songs, recitations and tableaux were intermingled. In one of the last named a little child was seen seated upon a hillock with a bowl of curds in her lap. She had been instructed to behave prettily and to take no notice of the people before her, but one thing she had not been prepared for. Suddenly a large toy-spider with all its legs dangling was let down, by an elastic thread, before her. Her start of unaffected terror was inimitable, and was warmly applauded, but of course this representation of little Miss Muffett could not be repeated. Yes, children regard spiders with fear, and older persons regard them with disgust; and yet there is much in spiders that is worth our notice, as I hope to show in the course of this paper.

Spiders are not insects. They belong to a different order, the *Arachnidæ*, which includes scorpions, ticks, mites &c., as well as spiders.

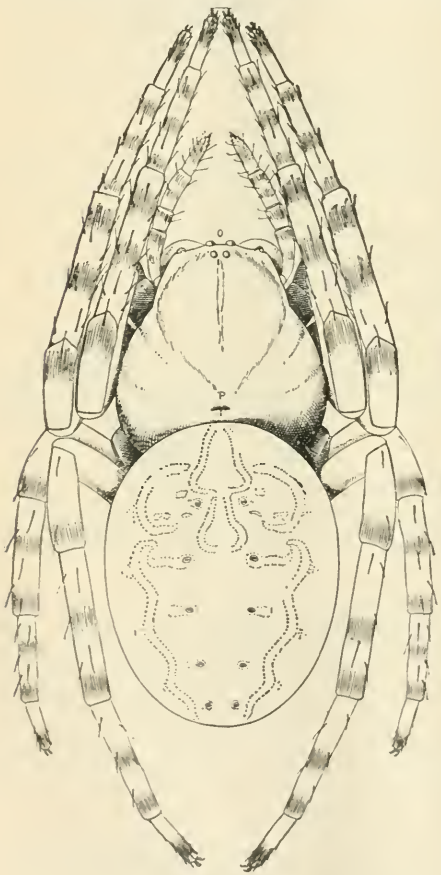


Fig. 43.

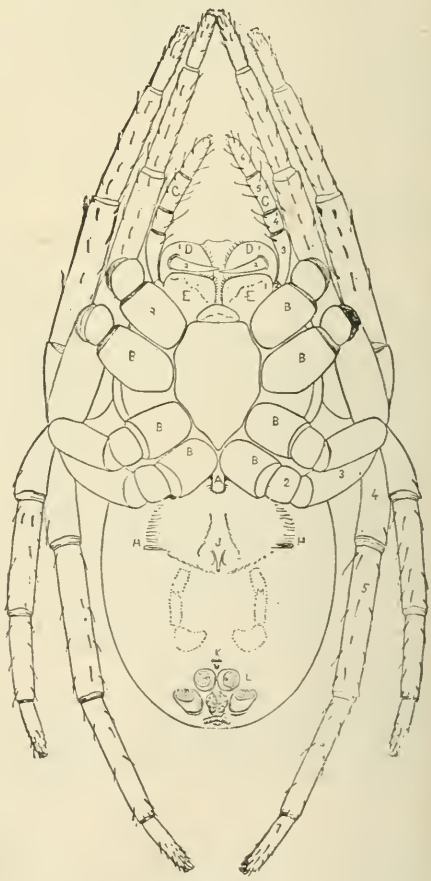


Fig. 44.

The word Arachnidæ is derived from the Greek Mythology. Arachne, as the story runs, was the daughter of Idmon, a Lydian. She was a skilful spinner and weaver, and was vain enough to enter into a contest with Minerva, who invented the arts Arachne practised. The ambitious mortal was defeated, and in her vexation hanged herself, but was turned by the gods into a spider.

Spiders differ from insects in the under-mentioned, as well as in some other, respects.

(*a*) In the spiders the head and thorax are united in what is called a cephalo-thorax. In the insects the head and thorax are distinct. (Fig. 43, upper surface of a spider; fig. 44, lower surface—both much enlarged).

(*b*) Spiders have no wings.

(*c*) They breathe by means of lung-sacs, through tracheæ which open under the abdomen.

(*d*) Their eyes are simple, not compound as in the insects.

(*e*) They have eight legs. Insects proper, in their perfect state, have only six.

(*f*) Their abdomens have no segments.

(*g*) After leaving the egg they grow, *but undergo no metamorphoses.* The insect passes from larva to pupa, and from pupa to imago.

Spiders have been divided into three tribes, according to the *number* of their eyes:*

I. Octonoculina—Eight-eyed spiders.

II. Senoculina—Six-eyed spiders.

III. Binoculina—Two-eyed spiders.

The families are named in most cases from *the habits of the species* they severally include.

Thus in the first tribe among others are found:—

The Salticidæ or Leapers (Fig. 45).

The Thomisidæ, or Binders (Fig. 46. The arrangement of the eyes is shown below).

The Drassidæ, or Seizers (Fig. 47).

The Linyphiidæ, or Weavers (Fig. 48), etc., etc.

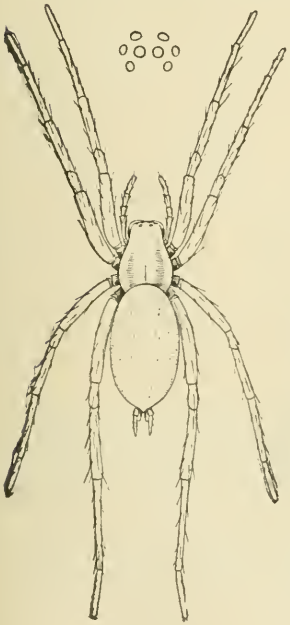


Fig. 48.

The form, colour and arrangement of the eyes assist the naturalist in determining the genera of spiders, thus:

The genus *Sphasus* has two large and six small eyes.

The genus *Salticus* (Fig. 45) has the eyes in three rows.

The genus *Philodromus* has them in two crescents.

The genus *Pholcus* has the eyes on prominent black spots, etc., etc.

The species are determined from *peculiarities of form, colour and markings.*

The spider has eight seven-jointed legs, terminated in every instance with three toothed-claws (Fig. 49), or with two such claws and a brush (Fig. 50). This may fitly be called *a hand-brush*, for the creature uses it for dusting its web.

Projecting from the spider's head are two six-jointed palpi, which are so large that they might almost be mistaken for another pair of legs; and between these are the for-

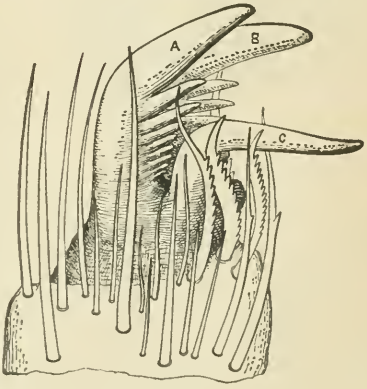


Fig. 49.

*Blackwall's "Spiders of Great Britain and Ireland."

midable mandibles (Fig. 51) toothed on the inner side, and furnished with fangs (*falces*) (Fig. 52) connected with a poison-gland. When the spider strikes a foe the virus is conveyed into the wound through a small opening in the fang (Fig. 52*a*).

Fig. 45

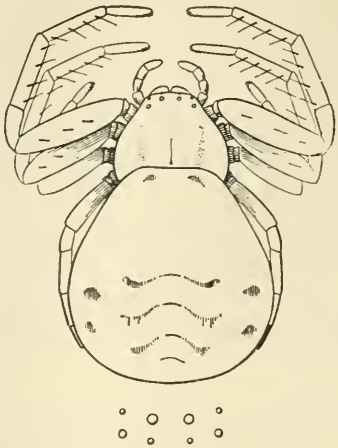


Fig 46.

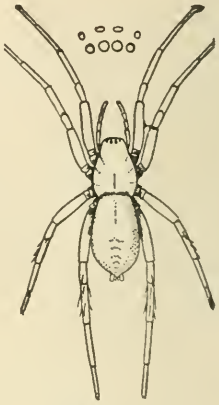


Fig. 47.

Behind the mandibles on the under side are the maxillæ or chewing organs. That the spider sometimes uses these without exercising its mandibles I know from experience.

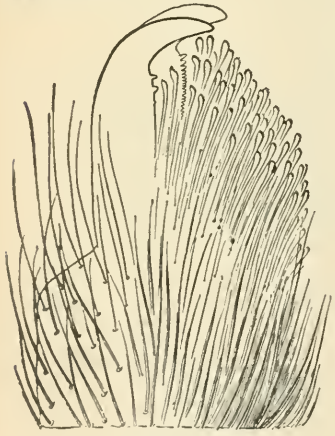


Fig. 50.

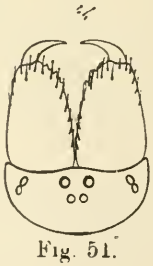


Fig. 51.

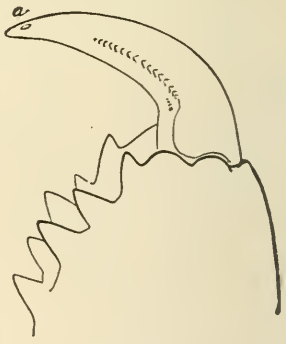


Fig. 52

I was sitting one day, intent upon a book, when a tickling sensation on the back of my hand diverted my attention. I glanced down, and saw that a large spider was biting me. I shook the creature off, and found a cup shaped hollow—into which I could have dropped a mustard seed—where it had chewed away the flesh. Beyond a little passing irritation, I suffered no ill effects from the bite.

When the fangs of the spider are used upon a human being the effects may be exceedingly unpleasant. I know a little girl who was wounded in the neck by a black spider. The flesh became greatly swollen and much discoloured, and the child was very ill. She was under the doctor's care for ten days.

The silk-bag of caterpillars is near the head; and the silken thread passes through and is controlled by the jaws of the insect. The spinning organs of spiders are near the other extremity of the body (Fig. 53). Inwardly they consisted of a number of glands,

and of tubes connected with these glands. The latter are gathered into clusters in the six outward spinnerets. The threads from all the tubes unite in the spinning, and yet in combination they form a thread so fine that it is only one-fifth the size of a silk-worm thread. It is so perfect that it has been used for marking divisions in scientific apparatus, for taking measurements of extreme delicacy and exactitude.

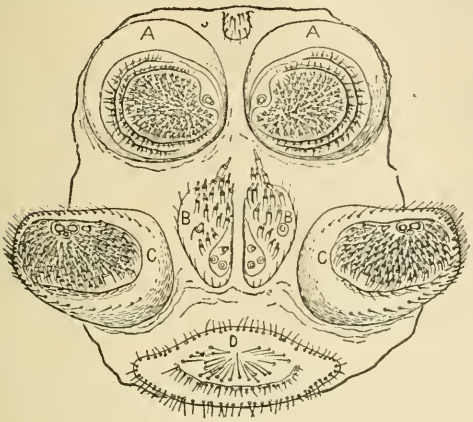


Fig. 53.

The female spider is generally much larger than the male. They do not live in the same nest, for the lady is of a capricious temper and has been known to fall upon and devour her mate. Indeed the cannibalistic tendencies of spiders are among the hindrances to rearing them with a view of employing their silk in manufactures.

There are, however, several species of spiders that frequent cellars, and that are of more peaceable dispositions than many of their kind; and these have been reared for a strange purpose. Fraudulent vintners after bottling and laying down their wine in cellars, have been ready to purchase spiders by the hundred at good prices. Set at liberty in the cellars of these men the spiders have speedily covered bins and bottles with a drapery of web that has conveyed the idea of age, and imparted a fictitious value to the wine.

The expedition with which spiders form their webs has ensured, it is said, on several occasions, the safety of fugitives. At a time of religious persecution in Europe, a man seeking a refuge crept into an oven, and a spider immediately commenced to spin its web before the door (Fig. 54). Before the pursuers arrived, its work was so far advanced that the men passed by the oven, remarking, "No one has entered there." A somewhat similar story is told by the Jews in regard to David, when he was in hiding from Saul, in the Cave of Adullam.

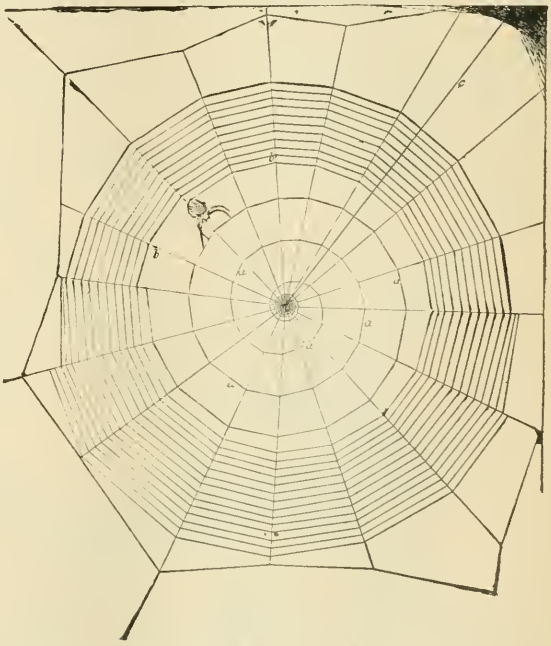


Fig. 54, web of an orb-weaver.

The perseverance of spiders in forming their webs under difficulties is remarkable. The well-known story told by Sir Walter Scott concerning Robert Bruce and the spider exemplifies this, and has thus been versified by Eliza Cook:

BRUCE AND THE SPIDER.

King Bruce of Scotland flung himself down in a lonely mood to think
'Tis true he was monarch, and wore a crown, but his heart was beginning to sink,
For he had been trying to do a great deed to make his people glad,
He had tried and tried, but couldn't succeed, and so he became quite sad.

He flung himself down in low despair, as grieved as man could be ;
And after a while as he pondered there, "I'll give it all up," said he.
Now just at that moment a spider dropped, with its silken cobweb clew,
And the king in the midst of his thinking stopped to see what the spider would do.

'Twas a long way up to the ceiling dome, and it hung by a rope so fine,
That how it would get to its cobweb home, King Bruce could not divine.
It soon began to cling and crawl straight up with strong endeavour,
But down it came, with a slipping sprawl, as near the ground as ever.

Up, up, it ran, not a second it stayed, to utter the least complaint,
Till it fell still lower, and there it laid, a little dizzy, and faint.
It's head grew steady—again it went, and travelled a half yard higher,
'Twas a delicate thread it had to tread, and a road where its feet would tire.

Again it fell and swung below, but again it quickly mounted,
Till up and down, now fast, now slow, six brave attempts were counted.
"Sure," cried the king, "that foolish thing will strive no more to climb,
When it toils so hard to reach and cling, and tumbles every time."

But up the spider went once more, ah me, 'tis an anxious minute,
He's only a foot from his cobweb door, oh say, will he lose or win it?
Steadily, steadily, inch by inch, higher and higher he got,
And a bold little run, at the very last pinch, put him into his native spot.

"Bravo, bravo!" the king cried out, "all honor to those who try ;
The spider up there defied despair, he conquered, and why shouldn't I?"
And Bruce of Scotland braced his mind, and gossips tell the tale,
That he tried once more as he tried before, and that time he did not fail.

Pay goodly heed, all you who read, and beware of saying "I can't,"
'Tis a cowardly word, and apt to lead to Idleness, Folly and Want.
Whenever you find your heart despair of doing some goodly thing,
Con over this strain, try bravely again, and remember the Spider and King.

The spider's web (Fig. 54) so frequently represented in pictures is that of the Geometrical Spider, *Epëira diadema*. It is formed with great regularity and is a beautiful object. Strange to say it is made up of two kinds of silk. The long, convergent, anchoring threads are not viscid, but the cross threads are thickly set with minute gummy drops, which secure the unfortunate insects that strike upon them.

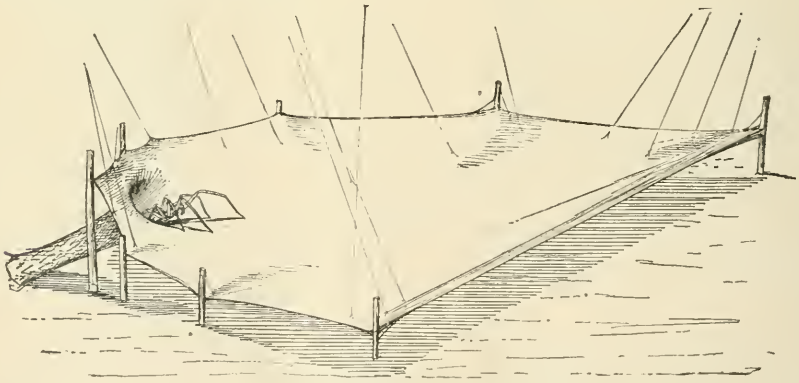


Fig. 55.

There is a species of spider (*Agalena labyrinthica*) which forms a closely woven web spread horizontally over the surface of the ground, and having a retreat at one corner of it (Fig. 55). It has been said of this, that, in the early morning, when the webs are white with dew, one might fancy that the fairies had been having a washing-day and had spread their sheets over the meadows to dry.*

The Gossamer Spider, *Neriene vagans*, often sets a fine silken thread floating at haphazard on the air. (Fig. 56). When this becomes entangled at the further end the spider secures the nearer one, and makes use of the thread as a bridge by which to

Mr. Mygale's Hobby, R. T. S. p 89.

pass to new hunting-grounds. The French call such threads *fils de la Vierge.* Sometimes the gossamer spider secures its thread and then spreads its limbs, and trusts itself to the summer air—the thread lengthening as it goes. Such spiders have been seen to alight on the topmost steeple of York Minster.*

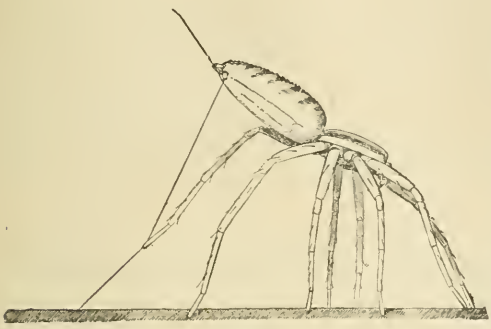


Fig. 56.

But the most remarkable of the weaving spiders is, I think, *Argyroneta aquatica.* This creature forms its web below the surface of the water. It shuns stagnant pools and rapid streams, but frequents deep ditches in which there is a gentle current. First it spreads its stays from one aquatic plant to another till sufficient anchorage is secured. Then from these it raises a closely-woven air and water tight dome, like the half of an egg-shell. Its next task is to supply this habitation with air, and to expel the water. Its proceedings for this purpose seem almost miraculous. It rises to the surface, throws itself over with a sudden jerk, and entraps, with a film of web guided by its hindmost legs, a globule of air about the size of a buck-shot. With this it scuttles down to its habitation, and dives beneath it. It then sets free its globule of air which rises to the top of the dome, and displaces some of the water. Repeated efforts fully accomplish its work ; and the spider has then an elegant, comfortable and secure dwelling-place. In it it lays its eggs, enclosing them in a cocoon or sack. Occasionally it makes an expedition for food, or to renew the air in its habitation. On the approach of winter it becomes torpid, and in this condition it remains till spring. As a boy, in one of the "Home Counties" in England, I often sat by a sluggish stream, and watched these spiders at their work.

The domestic spider (*Clubiona domestica*) is not a pleasant object. Its web is untidy, and its own appearance disgusting, but it intrudes everywhere. It "layeth hold with its hands, and is in kings' palaces."

Among remarkable spiders the Mygales or Bird-spiders hold the first place. Between thirty and forty kinds of them are known. The largest of them have a length of body of two inches and a half, and, when their legs are spread, measure eight inches from claw to claw. *Mygale fasciata* of Ceylon, *Mygale maculata* of South America and *Mygale Blondii* of the West Indies are among the giants. (Fig. 57. Mygale Hentzii of Texas).

Fig. 57.

Some of the Mygales are known as "Trap-door Spiders" They form tunnels in the earth several inches deep, and beautifully formed. The walls are hard and brown, but are lined with white silk, stiffened and

* Kirby and Spence's Entomology, letter XXIII.

smoothed with a natural cement. The doors of these habitations are wonderfully fitted and hinged, and close with their own weight.

Of the Wolf or Hunting Spiders the "Tarantula," *Lycosa tarantula apuliæ*, is a famous example. It abounds in the neighbourhood of Taranto (the ancient Tarentum) and Naples. In colour it is grey, and it has six angular black patches on the back of its abdomen. It is not a very large spider, being only a little over an inch in length. It hides in holes in the ground and under stones; and the bare-footed Italians are sometimes bitten by it. When a case of this sort occurs, the *fiddler*—not the doctor—is sent for; and the patient is kept dancing until utterly exhausted. After a brief rest he is aroused for another dance. And the exercise is renewed at intervals until the spider virus is supposed to have been eliminated.

There are some long-legged creatures that are commonly known as "Daddy Longlegs" or "Harvest Spiders." They are not true spiders—they belong to the Phalangiidæ. They have two eyes, one on each side of a sort of turret on the head. Their bodies are small and oval, and their eight legs are disproportionately long. They are useful creatures, feeding upon plant-lice and other insects, and, as far as I know, are quite harmless. Our commonest species are *Phalangium cinereum*, the ash-grey harvest spider and *Liobunum vittatum*, the striped harvest spider. Their eggs are laid in the ground, and the young come forth in the spring.

The naturalist who would collect spiders should carry a wide-mouthed bottle containing "*whisky blanc*." Into this he should drop the specimens as he finds them. He could afterwards place them separately in the same liquor, and in bottles of suitable size and form. The name of each specimen identified should be pasted on the bottom of the bottle. For classification the specimens might be placed in small racks—each *family* in a separate rack, and each *genus* in a separate row.

NOTES ON INSECTS OF THE YEAR—DIVISION I., OTTAWA DISTRICT.

By W. Hague Harrington, F.R.S.C., Ottawa.

My time was unfortunately so fully occupied during the season of insect depredations that my observations were very limited, and in consequence my notes are few and brief.

Grains and Grasses.—I did not hear of any insect attacks on wheat; neither was the Grain Aphis (*Siphonophora avenæ*) observed. The grasshoppers also were much less numerous than during the past year or two, possibly due to the unusual continuance of wet weather in midsummer. There was some Silver-top in old hay fields, caused probably by *Thrips poaphagus*, although Prof. Osborne has suggested that a large proportion of the injury known as Silver-top is due to the attacks of certain minute bugs.

Roots and Vegetables.—Cutworms continue to be troublesome, the commonest species being the Red-backed Cutworm (*Carneades ochrogaster* Gn.) The ravages of these very destructive grubs could be greatly lessened by a careful use of the traps mentioned last year and which are strongly recommended by Dr. Fletcher in his valuable reports. Such traps are formed by dipping bundles of weeds, grass or clover in a strong mixture of Paris-green and water, or by slightly damping bran and mixing thoroughly with it a little of the poisonous powder. Turnips did not appear to suffer much from the Striped Flea-beetle (*Phyllotreta striolata*) usually so destructive, nor from aphides, but towards the end of August they were pretty severely attacked by the White Cabbage Butterfly (*Pieris rapæ*) and by the diamond backed moth (*Plutella cruciferarum*). Onion, Cabbage and Radish maggots (*Phorbia*) were not quite as bad as last year, but still inflicted considerable loss. The White Cabbage Butterfly also considerably infested cabbages.

Peas and Clover.—A few peas have been found injured by the Pea Weev (*Bruchus pisi*) but the insect is very rare in this district which is outside its usual limits

A new pest has been observed upon Sweetpeas in gardens, viz. the Pea Aphis (*Nectarophora destructor*) which was very bad on some hedges of sweetpeas late in the season. Owing to the wet season in July injury by red spider was only complained of in a few places. Some damage was done by the Green Clover Weevil (*Phytonomus nigrirostris*) a serious attack having been noticed in the experimental plots at the Central Experimental Farm. The Black Armyworm (*Noctua fennica*) attacked both peas and clover, and was also troublesome in gardens.

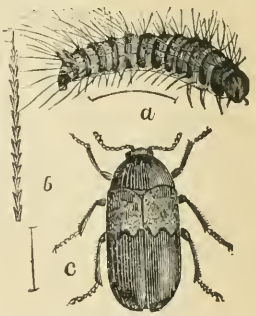


Fig. 58. Dermestes lardarius. A., larva; B., hair of do. magnified greatly; c., beetle.

Fruit.—The Currant Aphis (*Myzus ribis*) was rather abundant, but was largely destroyed by the larvæ of various lady-birds (*Coccinellidae*)—The Currant Sawfly (*Nematus ribesii*) also continues to greatly defoliate currant and gooseberry bushes whenever prompt measures are not taken to destroy the broods. The last brood of the Cherry Slug (*Eriocampa cerasi*) was very abundant upon both plums and berries. The Oyster-shell Bark-louse (*Myrtilaspis pomorum*) has been bad in neglected orchards, but such places are naturally breeding grounds for many pests.

Forest Shade Trees.—The Tent Caterpillars (*Clisiocampa*) were again enormously destructive, and large areas were completely stripped, and the woods were rendered very unsightly and

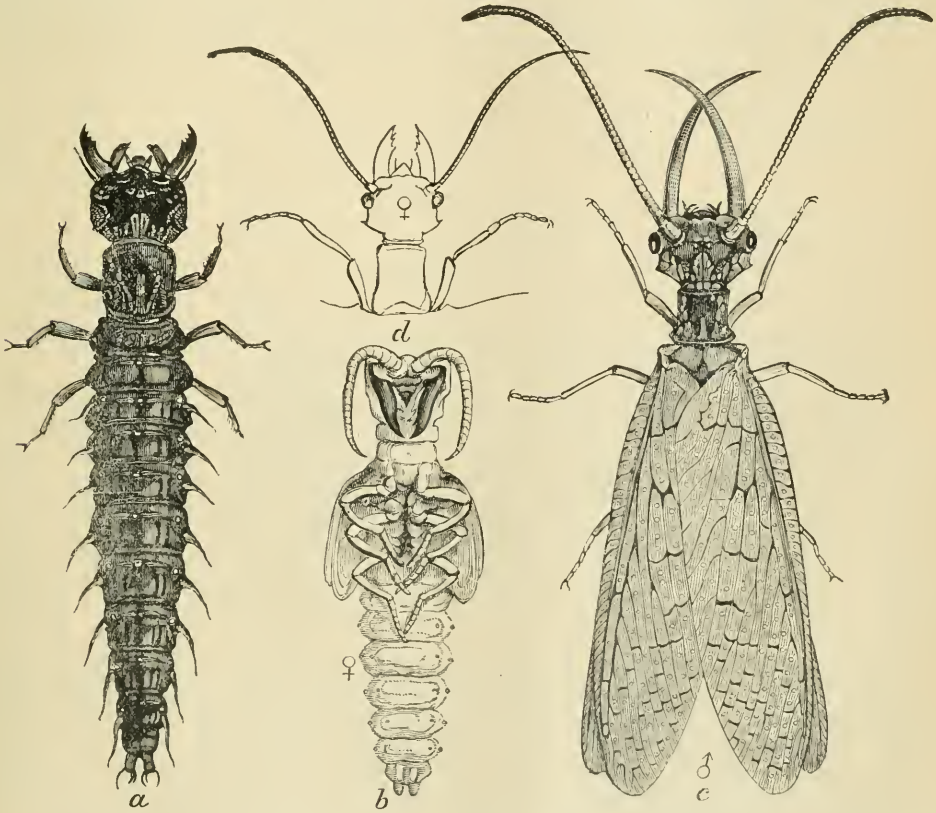


Fig. 59. Corydalis cornutus: A., larva; B., pupa; C., male; D., head and jaws of female.

uninviting by the quantities of webs and larvæ. Parasites, however, seem to be increasing, and many caterpillars also died from a fungous or bacterial disease.

The moths seemed less abundant around the electric lights, but in the woods there are now to be found many fresh egg-masses, so that the plague promises to continue next spring. The Yellow-necked Caterpillar (*Datana ministra*) did some damage to birches and was occasionally seen on elms. *Vanessa antiopa*, which is frequently a serious pest on our ornamental elms, seemed this year to confine itself to the willows. Elms, however, suffered very much from the attacks of plant lice, which were so numerous that the trees dripped moisture to such an extent that the sidewalks beneath them were kept quite wet for several weeks. The White Cedar Lecanium (*Lecanium Fletcheri*) was abundant upon some Arbor-vitae trees, but was severely attacked by the parasites which Dr. Howard bred from specimens which were sent to him some years ago from the Experimental Farm. *Nematus Erchsonii*, the Larch Sawfly, seemed to be more abundant there last year, although by no means in such numbers as it was several years ago, when its ravages resulted in the destruction of the greater part of our larches. The Spruce Kermes (*K. abietis*) has become more abundant and does serious damage, but the Spruce Sawfly (*Lophyrus abietis*) seemed less numerous. Canker Worms were little in evidence.

Miscellaneous.—There was a remarkable abundance everywhere of *Dermestes lardarius* (Fig 58) and some houses were so infested that the beetles were a veritable plague After the July rains mosquitoes made their appearance all through the city in great numbers and were especially troublesome in the sections where lawns and gardens are most numerous. Many of the residents on such streets kept smudges burning every evening during the period of the abundance of these irritating flies. Kissing-bugs of various orders were brought in for identification, generally on the principle that the bigger the insect the more likely it was to be dangerous; the favorite competitor seeming to be the male of *Corydalis cornutus*, (Fig. 59).

NOTES ON THE SEASON OF 1899, DIVISION NO. 2.

By J. D. Evans, Trenton, Ont.

Owing to pressure of duties the writer's opportunities during the past season for observing the presence of destructive insects were extremely limited.

One insect (*Clisiocampa sylvatica*) was, however, so numerous and destructive to the foliage of forest trees that the most unobservant person could hardly avoid noticing the destruction going on. From Trenton northerly to Bannockburn, a distance of about 46 miles, but more especially from Chisholm's Rapids northerly to the same point some 33 miles, the depredations were most severe. In many places the trees were nearly defoliated, but in some sections, blocks of woods were left without a vestige of a leaf. This caterpillar did not confine itself to forest trees, for orchards in the vicinity, although separated by many rods of cultivated land, were badly attacked, and one case can be recalled in the Township of Rawdon where an orchard consisting of from 100 to 200 trees was completely defoliated.

The caterpillars were in such immense numbers that on the 1st day of June, on the railway track, at a point about two miles north of Marmora station, the passenger train became stalled, and it was necessary to sweep the rails and use sand to enable the train to proceed. Three-quarters of an hour was consumed in making 300 yards.

The defoliated trees, releaved later in the season with diminutive leaves, in many cases however with large trees only the lower limbs showed signs of life. In sections where the insects had been prevalent in former years it was noticed that the tops of large trees were generally dead.

The Tent Caterpillars (*C. Americana*) were prevalent in neglected orchards; they were also observed to attack the mountain ash, their nests being seen on the trees.

NOTES ON INSECTS OF THE YEAR—DIVISION No. 3, TORONTO DISTRICT.

By Arthur Gibson, Assistant Entomologist, Central Experimental Farm, Ottawa.

Toronto and its vicinity have not, so far as I have been able to learn, suffered very seriously from the attacks of injurious insects during the past year.

The Tussock Moth (*Orgyia leucostigma*) caused some damage to shade trees, mostly horse chestnut, along many of the streets in Toronto during the past summer, but was not nearly so abundant as in the previous few years. One locality especially, however, suffered seriously, namely, the St. James's Cathedral property. The horse chestnut trees around the Cathedral were attacked and the foliage entirely destroyed in some cases. In 1896, the year Toronto was visited to such an alarming extent by this pest, many of these trees, were perfectly stripped of leaves. The Toronto civic authorities ever since 1896 have been painting the shade tree on a large number of streets, with a mixture, which I think is called "Caterpillarine," but this apparently has not been much of a protection. No doubt many of these caterpillars which had fallen to the ground were prevented by this sticky substance from climbing up the trees, but of course, it did not have any effect on the great majority which were up in the trees and which were doing the damage. I think if the civic authorities had taken this matter up at the proper time and sprayed the trees sufficiently, before the caterpillars got too large, with one of the standard arsenical mixtures, such as Paris green, or arsenate of lead, much of the foliage would have been saved, and the pest to a much greater extent stamped out. Much good work, however, was done by the destruction of large numbers of egg masses, which were collected from the trees by school boys and others, at a small outlay by the City Council.

The Tent Caterpillars, as in many parts of Canada, caused considerable damage to forest and fruit trees in the vicinity of Toronto. In early spring I noticed dozens and dozens of "tents" on wild cherry trees close to the Humber River. Many of the fruit trees in neighboring farms were also badly infected.

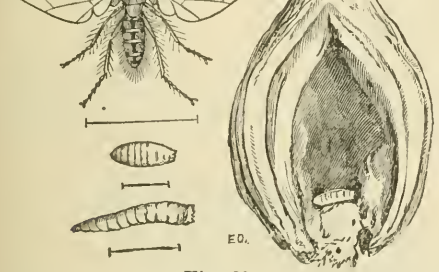


Fig. 60.

The Onion Maggot (*Phorbia ceparum*) Fig. 60, was troublesome in certain market gardens. Mr. Crew, in a conversation, mentioned that a friend of his has had good success in fighting this insect by the use of alum diluted in water, and sprinkled along the rows of onions with an ordinary watering can. All of these root maggots are difficult to treat, some experimenters obtaining results with certain materials, which in the hands of others appear to have been of little value. The most successful experiments recorded in Canada, mentioned in the Reports of the Dominion Entomologist, have been with carbolic acid, in some of its various forms, and white hellebore. Full details of these experiments can be obtained from his reports.

The Red Spider (*Tetranychus telarius*) Fig. 61, was reported as doing damage to sweet peas on the property of Mr. Edward Leadley, of Robert Street, Toronto, who stated that this insect had appeared in sufficient numbers during the past summer to injure his crop of sweet peas. These little creatures although commonly called Red Spiders are not real spiders, and are difficult to treat when they become once established. As soon as they are noticed, if the plants are sprayed with kerosene emulsion, or whale-oil soap, much good will result. Dusting with sulphur is also very useful. Sweet peas in Toronto were also attacked by the Destructive Pea Louse (*Nectarophora destructor*) which has done so much harm this year in Canada, particularly in New Brunswick and Ontario. Mr. Leadley writes that it was extremely injurious on his sweet peas. In other places it has not only attacked this favorite flower but also done injury to field peas.

In Parkdale, Toronto, many of the residents complain of the prevalence of fleas in their houses during the past summer. About the first week in September these little pests were extremely abundant, much to the writer's regret, as he spent a night at a friend's house, while he was visiting Toronto. These may have been introduced into the houses at first, no doubt, through the agency of some pet animal, and had probably multiplied during the summer absence of some of the residents. The young larvae feed upon animal matter in dust, and being very slender and active, penetrate into the smallest of cracks in floors, walls, etc., and where dust has accumulated will breed rapidly. Thorough cleanliness therefore, and a frequent use of scalding water, will do much to remedy the occurrence of this pest.

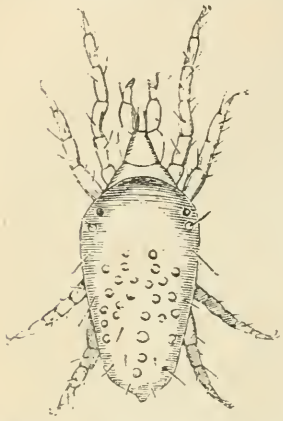


Fig. 61.—Red spider, greatly magnified.

Another insect which has caused some anxiety in Toronto during the past season is a black aphis attacking violets (*Rhopalosiphum violae* n. sp. Perg.). Mr. J. H. Dunlop, the well-known florist, has noticed the occurrence of this pest in his green houses among his violet beds. On the 13th October, when in Toronto, I visited Mr. Dunlop's houses and found this aphis very abundant, but fortunately it has not done much damage as yet in this country. Last year Mr. Dunlop's violets suffered from an attack of *Emphytus Canadensis*, the Pansy Sawfly, but this year he has not been troubled with this insect. A small pyralid moth (*Phlyctaenia ferrugalis*) appeared among Mr. Dunlop's rose bushes the past year, and its larvae occurred in sufficient numbers to cause some damage to the foliage of these plants. When full grown the larva is about $\frac{3}{4}$ of an inch in length, and is a semi-translucent green with a dark green dorsal stripe, on each side of which is a sub-dorsal white band. Those which were found by the writer, when in Mr. Dunlop's houses, were feeding on the underside of the leaf, which had been drawn together somewhat by means of a slight web, the injury seemingly being chiefly done by eating the soft tissue on the lower side of the leaves.

NOTES ON THE SEASON OF 1899.

By J. Alston Moffat, London.

From various causes, personal observations on the doings of insects during the past season, were with me decidedly limited; so I was dependent in large measure upon the observations of others for my knowledge of what was going on in the insect world.

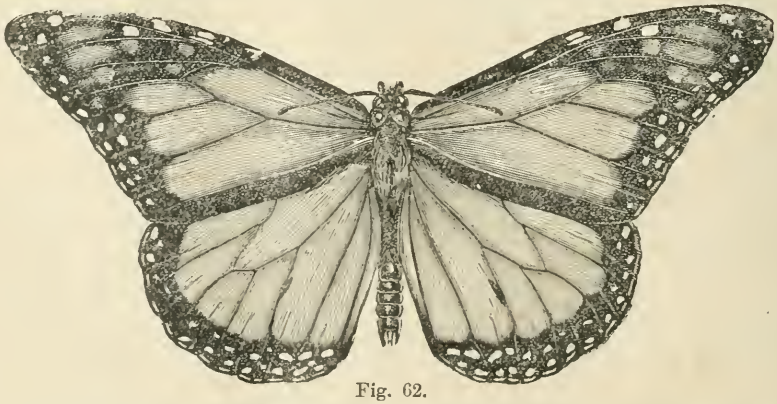


Fig. 62.

The Colorado potato beetle, *C. decemlineata*, was very late in putting in an appearance; so much so that many thought that the severe frosts of the previous winter on the

bare ground had finished its career, but later on Paris Green was in demand all the same. The imported cabbage butterfly, *Pieris rapæ* was to be seen in abundance, especially during the latter part of the season. The moth of the climbing cutworm, *Hadena arctica* which was such an unwelcome intruder in houses in the season of 1895, was again in evidence, but in moderate numbers.

The superabundance of the Milkweed butterfly, *Anosia archippus*, (Fig 62) attracted general attention, even amongst those who are not in the habit of noticing butterflies. It appeared early, and kept increasing in numbers until about the end of August; whilst specimens of it were taken as late as the middle of October. One of our members who lives in the country, a short distance from the city, told me that he was out in a field one evening when he saw them in great numbers hanging to the heads of grain, and that he picked off several dozens of them with his fingers. Another of our members informed me about the end of August, that he had been in a wood to the North-East of the City with his dog, which started them up by the hundreds from bushes where they had settled down for the night; and he thought it something very strange, but I had no difficulty in showing him from books that it was a well-known habit of theirs. And yet this gathering in flocks at a particular place to pass the night together like birds, long before their time for migrating has come, is indeed a singular disposition for butterflies to display. (Fig. 63.) During daytime they care nothing whatever for each other's company, but fly aimlessly about as solitary individuals, as if they were in a meditative mood. When, with night's approach they begin to congregate at their rendezvous, then they cannot get close enough to each other; but will crowd themselves in where there is no room, to the great inconvenionce of those already there, and so cause much commotion in the flock before they finally settle down for their night's repose. *Anosia Archippus* appears to be an Entomological Enigma.

Fig. 63.

Reports of the butterflies appearing in vast numbers have been received from various localities, and newspapers have reported swarms of them as filling the air, but no intimation was given as to whence they came or whither they were going; indeed, the observers probably did not know that it was of any importance as to where they were going, or if they were going anywhere at all in particular, and so missed an opportunity of adding to our knowledge in this matter.

This has been a favorable season for making observations, as they were moving in masses that could be easily watched. and a definite idea obtained of their rate of travel and the direction taken by them. But this is a kind of work that a central bureau of entomological information can alone accomplish satisfactorily. Notice could have been sent in of their having left the north, and warnings issued to every observer to be on the lookout for them on their way south, and thus a connected account obtained of their movements from start to finish.

Mr. Bird's paper in the *Canadian Entomologist*, vol. 30, page 126, giving his method of securing the larva and pupa of a variety of species of the genus *Hydræcia* in their different food plants, and thus obtaining the moths in a perfectly fresh condition, which is of such advantage for the correct separation of the species in this genus, created much interest amongst collectors, and an effort was made here to follow out his directions, which resulted in a good measure of success. Mr. Bice secured in large numbers *H. cataphracta*, *H. nitela* and its variety *Nebris*, from Burdock, Giant Ragweed, Elder and Wild Parsnip. Mr. Balkwill collected in Burdock principally, from which was obtained a fine series of *Cataphracta*, with an interesting amount of variation in the depth of coloring, and in the conspicuousness of their ornamentation, which was gratifying to secure. Thus, although the hunts produced nothing new, they gave encouragement to the hope

that with the knowledge acquired, better results may follow renewed efforts next season. There are species of *Hydrœcia* taken here whose food plants are not yet known, and a knowledge of which is of sufficient importance to warrant an expenditure of time and labor in an effort to try and discover them. But, as Mr. Bird has remarked, more species may be found in that way whose presence was never seen or suspected in that locality.

During the past five or six years the ornamental Birch trees of this city have been showing signs of being affected by some disease; indeed, several large and much valued trees have died outright during that time. The preliminary symptoms are a weakening of the growth, and a thinning of the leaves at the apex of the tree, which gradually spreads downwards until the whole tree is affected and gives up its life. I have thought that it might result from the work of borers, and I have taken *Clytanthus ruricola* and *Agrilus bilineatus* on the trees, and have seen many holes in the trees out of which such beetles might have come,—with Woodpeckers' work conspicuous and abundant. And yet, if they are to blame, it does appear strange that the trees should be affected in that particular way; unless the borers are more numerous at the top than they are at the base of the tree.

A few important additions have been made during the past season to the Society's collection of native lepidoptera; amongst them are the following:

Orthosia helva, Grote. A species which I have had the impression for many years should be classed as Canadian, but could get no authentic record of its capture in Canada, until last summer, when Mr. H. S. Saunders of London took it at Ottawa, and presented a specimen to the Society.

Aglossa cuprealis, Hub. Taken at light by Mr. Bice.

Hydrœcia furcata, Smith. This was a capture made by Mr. C. G. Anderson several years ago. I regarded it as a badly faded specimen of some common form; but when seen by Dr. J. B. Smith, he informed me that the color was normal, and that it was really a very good species.

Hydrœcia stramentosa, Guenee. This is a species that has been regarded by Canadian collectors for the past thirty years as belonging to our fauna, and was placed in our label list as such; but all inquiries on my part failed to elicit any information concerning it, until I began to suspect that there had been a mistake made somewhere. Recently, whilst engaged in naming some material for Mr. Dwight Brainerd, of Montreal, a difference of opinion arose between us about the correct name of a *Hydrœcia*, which was settled by Dr. J. B. Smith in his favor. Then Mr. Brainerd sent me a second specimen of the disputed form, and with it another *Hydrœcia*, which he said he took at Montreal in numbers every season, and which was known to them as *Stramentosa*. And there, sure enough, was the long lost and much desired species, which had been kept out of sight, and from public knowledge through all these many years. This I regarded as the prize of the season.

NOTES ON THE SEASON OF 1899.

By Rev. C. J. S. Bethune, London, Ont.

The writer's opportunities of collecting and observing insects have been very limited this year owing to his removal from Port Hope to London in the middle of the summer. No one, however, could fail to observe the enormous abundance of Tent Caterpillars (*Clisiocampa*) and the amount of damage inflicted by them on the foliage of fruit and forest trees. From every part of the Province they were reported to be similarly abundant, though in many places much more destructive than in others. In the neighbourhood of Port Hope the "Forest" species (C. *disstria*) was not particularly noticeable and did not cause any injury worth mentioning; but the "Apple tree" species (C. *Americana*) was very abundant and destructive to foliage of fruit trees in gardens and orchards, especially

where no attempt was made to get rid of them.. In the winter the egg-bracelets may be cut off and destroyed, and in early spring the tents, or webs, can easily be seen in the forks of small branches when the tender leaves are expanding and can be removed without much difficulty. By adopting these means, the writer cleared his garden almost completely, a few stray caterpillars only escaping destruction.

The only other general outbreak of the year was that of various species of Aphides (plant lice), which have been swarming in myriads for several seasons now and attacking a large number of cultivated plants. The long continued drouth in the summer, combined with some very hot weather, reduced their number considerably and caused them to be much less troublesome in the autumn. During the two preceding seasons in October and November the air on sunny days was filled with infinite numbers of the winged specimens to the great annoyance of everyone out of doors, but this year, though numerous enough, they did not cause the same amount of discomfort and we may infer that they are not likely to be so abundant and destructive next year.

Every gardener and fruit grower has some insect or other to complain of; our famil iar enemies are always at work, cut-worms, caterpillars, potato-beetles, codling worms, grasshoppers, curculios, slugs, sawflies, flea-beetles, and hosts besides, but there has been no one kind in more than ordinary abundance or requiring more vigilant measures for prevention than usual.

Among other insects—those that do no injury to cultivated plants—may be mentioned the handsome Archippus butterfly. Last year it was unusually scarce, but this year it swarmed all over the country, in cities and towns as well as in the rural districts. Even the most indifferent could not fail to be struck with the great numbers of these beautiful creatures which float so majestically in the summer air. Their curious practice of assembling in large numbers in the evening and roosting together was noticed by many observers. Night after night the writer observed them flying singly in rapid succession up the hill on which his garden stood, and, after a little soaring about, gathering together on the dead branches of some trees close to the house. Here they would huddle together in great numbers till the bough looked as if clothed with brown leaves of a triangular shape. If disturbed they would flutter about for a few minutes and then settle down again on the same or a neighboring twig. The late arrivals usually caused much commotion by trying to force their way in where there was no room for them. This singular proceeding lasted for many nights and was watched with great interest. When darkness came on they could easily be picked off with one's fingers without causing any alarm amongst those close by. In the early morning they were all off again on their individual duties or pleasures, and showed no desire for the companionship of others till the fading light of day caused them to look for a sleeping-place. The phenomenon is a singular one and not easily to be explained.

Another handsome butterfly, *Papilio Marcellus*, was seen again at Port Hope this summer. As this makes the fourth year of its appearance in the same locality, we may infer that it has succeeded in making a permanent residence there, though in very limited numbers at present.

In August last, the Editor of the "*Mattawa Tribune*" sent to the writer for identification, a caterpillar, which changed to a chrysalis before it arrived at its destination. It proved to be the Tiger Swallowtail (*Papilio Turnus*). About the middle of November, there emerged from the chrysalis, which had been kept in a warm room, instead of the expected butterfly, a large ichneumon fly, *Trogus fulvipes*, Cresson. This is rather a rare species, our common parasite of the Papilios being *Trogus exesorius*, Brulle, and is reported from the Province of Quebec, Maine and New Hampshire. It is almost entirely black with smoky wings, the lip, knees, tibia and tarsi being yellow.

The locust trees in and about Port Hope have been for some years severely attacked by the grubs of the well-known boring beetle, *Cyllene robiniæ*, and a large proportion of the smaller trees have been killed by them. In the case of older trees, branches and limbs are so much perforated that they break off when violent storms occur, but the tree itself does not usually succumb. Another enemy is now, however, at work boring into the solid wood, and it is not likely that even the largest trees will long be able

to withstand these combined attacks; this is called the locust tree carpenter-moth (*Prionoxystus robiniæ* Peck). The larva, when full grown, is between two and three inches in length and nearly half an inch in diameter; its borings through the solid wood are consequently very large and cause much injury to the trees. Fortunately the timber is of no commercial value, the trees being grown for shade or ornamental purposes, and being attractive chiefly from the fragrance of the blossoms and the ease and rapidity with which they can be grown. The moths of this species are very singular in appearance; the females are of a grey colour, similiar to the bark of a locust tree, the fore-wings being closely covered with a net work of black lines and having also some irregular black spots; the hind wings are of a uniform dusky color; the wings expand about three inches. The male moths are much smaller, expanding only about two inches, darker in colour and distinguished by a large bright yellow patch on the hind wings. They are so unlike the other sex that they might easily be taken for a different species. The females come into houses attracted by light in June, but the males are rarely seen.

The squash bug (*Anasa tristis*) fig. 23 has been very abundant this year on the squash plants, great colonies of larvae in all stages of growth being found; these are of an ashen grey colour with pink antennae. When they have reached this stage in their career, it is not easy to find a remedy; in the case of a few plants in a garden hand picking may be resorted to, that is they can be brushed off into a shallow tin dish and then destroyed. But where they are grown on a large scale for marketing, kerosene emulsion might be applied but would involve a good deal of trouble as the bugs are concealed and somewhat protected by the leaves towards the base of the plant. As the insect passes the winter in the full grown state, many may be destroyed in the autumn when they are wandering about in search of shelter; and in the early summer, when they come out to lay their eggs, they may be trapped by placing chips or small pieces of board close to the young plants; under these they will hide in the day time, and may then be readily captured and destroyed.

An interesting capture in London was made by Mr. Short, one of the city postmen. On September 26th, when going his rounds he found a perfect specimen of the large and handsome sphinx moth, *Phlegethontius cingulatus*, which is distinguished by the series of rose-red spots on each side of its abdomen.

NOTES ON THE SEASON OF 1899.

By Rev. T. W. Fyles, Levis, Quebec.

The season of 1899 was, at Quebec, a strangely variable one. The thermometer under my verandah recorded 93° in the shade on July 25th, and 43° in the shade on October 2nd—a difference of 50°. On the latter date there was a slight flurry of snow.

The weather was dry when rain was needed, and wet when fine weather would have been welcome. So dry was it, for a time, that the leaves of some exposed trees withered and fell untimely, without having taken the autumn tints. For the same reason the potatoes on the high land have been found to be small and few to the hill.

Insect Pests.

Early in the season the tent-weaving caterpillars of *Clisiocampa Americana* Harris and *C. disstria*, Hbn. were exceedingly numerous and troublesome. On the railway, in parts of the eastern townships, their crushed multitudes are said to have made the rails slippery, and retarded the progress of the trains.

On the Island of Orleans, early in June, the larvæ of *Hybernia tiliaria*, Harris, defoliated many young trees. (Fig. 64.)

Butterflies.

In June *Papilio Turnus* Linn, and *Danais Archippus*, Fab., were unusually abundant. On the 25th of the month I found Archippus larvæ in the second and third stages. At the same time the female butterflies were hovering about the milkweed in numbers, laying their eggs one here and one there on the plant. The more advanced larvæ were full fed on the 4th of July, and suspended themselves for the pupal change. A day later they cast the last caterpillar skin, working it upwards till it reached the cremaster, when a succession of convulsive twists dislodged it, and it fell to the ground. The abdominal segments were then drawn up and shaped into the rounded summit of the very beautiful pupa. The pupa changed from green to a rich mahogany brown in the night of July 16th-17th, and the perfect insects appeared in the afternoon of the 17th. Butterflies of this species were on the wing throughout the month of August

Fig. 64.—Hybernia tiliaria: the winged male and wingless female moths; larvæ of various sizes.

In July *Chrysophanus epixanthe*, Bd., and Lec.. was unusually abundant at the Gomin Swamp.

In August larvæ of *Grapta interrogationis*, Fab., were found feeding upon hops which shaded the verandah of the country residence of the Hon. Richard Turner, on the Island of Orleans.

In this month I saw *Pamphila Manitoba*, Scud, on the Heights of Levis, but not in numbers.

Saw-flies.

In the Society's Annual Report for 1897, on page 73, I gave an account of the saw-fly larvæ that fed on poplar, and a description of the perfect insect. Mr. Ashmead has since identified this for me as *Nematus luteotergum*, Norton.

On the same page I described saw fly larvæ that fed on *Cornus*. They buried themselves in October, and I found some of the larvæ quite fresh in the Spring, but they failed to pupate, and perished. Last fall I obtained a new batch of the larvæ and placed in the cage with them some pieces of decayed birch-wood. On the 15th of September, immediately after a moult, they proceeded to tunnel into the wood. All had disappeared before the 24th of the month. It was amusing to see how expeditiously and neatly the creatures accomplished their task. Every larva cleared its way with a whisk of the after part of its body, which scattered the *frass* in a regular circle of about the diameter of a half dollar. The finished hibernaculum was a clean-swept, oval chamber, just large enough to hold the larva comfortably. In this the creature remained unchanged till the middle of June. On the 20th of June I saw the skin of one specimen burst at the head and reveal the pupa. The insect in the pupal stage was seven and a half lines in length, waxen in appearance. The head was distinct, and the eyes showed through the skin as

reddish-brown spots. The antennæ and legs were free. Imagos of the species appeared in the last week of June and the first week of July. They proved to be *Harpiphorus tarsatus*, Say.

In the beginning of July, in examining a discolored larva of the species, I made a small opening in the head and suddenly a very active specimen of *Hemiteles mucronatus*, Prov., burst forth. Individuals of this species had previously shown themselves in the cage.

A Parasite of Hylotoma Pectoralis, Say.

In the beginning of the season I obtained a specimen of *Pimpla inquisitor*, Say, from a pupa of *Hylotoma pectoralis*, Say.

Dates of Appearance of Certain Insects..

My insect breeding cage was placed out of doors, and was buried under the snow during the winter. It was not taken in till the spring opened. The following then may be regarded as indicating the natural times of appearance of the species mentioned.

Papilio Turnus, Linn, appeared May 28th.
Papilio brevicauda, Saund, appeared May 23rd.
Sphinx Kalmiæ, A. & S., appeared May 25th.
Sphinx luscitiosa, Clem., appeared May 27th.
Paonias excœcatus, A & S., appeared May 27th.
Edema albifrons, A & S., appeared May 27th.
Cerura borealis, Boisd. appeared June 3rd.
Cerura scolopendrina, Bdv. appeared June 6th.

Sphinx Luscitiosa, Clem.

On the 27th of May two beautiful specimens of this moth appeared in my insect cage. The larva of the species feeds on *Populus tremuloides*. It is long in proportion to its girth. It is apple green in colour and has seven side lines. Each line is white below and mauve darkening to purple above. The last line is extended to the end of the horn which is green and rather short. On the body are numerous minute rings with white centres. These are most numerous on the 3rd, and 4th, segments, and along the sides. The head is green, and has a yellowish-white line down either side, supported by a dark purplish line outwardly. The cheeks beyond the lines are spotted with white. The true legs are whitish and tipt with brown. The larvæ were full fed on the first of September, and buried themselves in the soil.

Intruders.

Periplaneta Australasiæ.

In the beginning of June, a fine specimen of the Australian Cockroach (*Periplaneta Australasiæ*) was found in a bunch of bananas by Oswald Davie, a junior member of the Quebec branch of our society.

Tenebrioides Mauritanicus Linn.

In the middle of April, I discovered a number of "Cadelle" larva in some Graham flour obtained from a store in Levis. This is a description of them :

Larva 7 lines in length, greyish white in color, somewhat flattened in appearance, has white hairs thinly scattered over its body. The abdominal segments are larger than the thoracic. The head is brown and shining, as is also the plate on the second segment. The last segment has a peculiar dark brown forked termination. The legs are wide-spread, amber in colour. When near pupation the larvæ managed to escape.

A Busy Scene.

On the 14th of June I found a thorn-tree (*Cratægus crus-galli*, L.) in full blossom. Growing on the north-west slope of a cliff, it was later in flowering than other trees of its sort. I was surprised to see the multitude of insects that thronged it. In the few minutes that I stood by, I noticed many specimens of the undermentioned kinds:—

Butterflies—*Papilio Turnus*, Linn; *Lycæna Couperi*, Grote.

Beetles—*Clytanthus ruricola*; *Anatis 15-punctata*, Oliv.; *Cyrtophorus verrucosus*, Oliv.; *Leptura lineola*, Say; *Donacia emarginata*, Kirby.

Two-winged Flies—A species of *Chionomus*; *Pangonia tranquilla O. S.*; *Stratiomyia obesa*, Loew; *Milesia excentrica*, Harris; *Syrphus xanthostomus*, Wied; *Sericomyia militans*, Walker, *Sphœrophoria Cylindrica*, Say; *Musca Cæsar*, Linné.

Bees—*Apis mellifica*, Drury; *Andrena nivalis*, Smith; *Osmia bucconis*, Say.

Wasp—*Vespa maculata*, Fab.

Saw-flies—*Tenthredo lineata*, Prov.; *Monophadnus scelestus*, Cr.

Metzneria Lappella, Linn.

In the beginning of September, 1898, I discovered, in the heads of Burdock, a curious larva, of which the following is a description:

Head bi-lobed, brown; mouth organs large. A brown plate, marked longitudinally by a white line, on the second segment. Body rounded, much crinkled, of a fatty appearance, having a few white hairs along the sides. Anal segment small and protruding. The legs small and weak. The pro-legs seemingly atrophied into mere pseudopodia. Length of larva two and a half lines.

On the approach of winter, the larva having eaten out a convenient hollow in the closely packed seeds, cemented its surroundings together, and then lined its cell with a flocculent white cocoon. In this it remained unchanged till the beginning of June when it went into chrysalis.

The pupa was of elegant shape, amber-coloured—the head parts darkening into brown. The antennæ and legs were traceable through the skin. The length of the pupa was three lines. The moths appeared in the end of June and continued till August. They mated about the middle of July.

The dimensions of the perfect insects were as follows:

Expanse of wings (male) $5\frac{1}{2}$ lines, (female) 9 lines.

Length of body (male) $2\frac{1}{2}$ lines, (female) 4 lines.

Length of antennæ (male) 2 lines, (female) 3 lines.

The eyes of the moth were large and prominent, in color they were a rich, warm brown. The palpi were reflexed—the second joint was long and had long scales, and the terminal joint was pointed. The antennæ were filiform, prettily encircled with minute, short bristles at the joints. The proboscis was long and coiled up, watch-spring fashion. The body terminated with a tuft like a paint brush. The tibia in the hindmost pair of legs had two pairs of spurs—that in the second pair, had but one pair of spurs.

The fore-wings were of a pale sienna brown, with a patch of darker brown extending along the costa and towards the inner margin, for two-thirds of the length of the wing. There were three or four lines of darker scales towards the hind margin and following its curve. Some of the specimens had the three dots on the disk spoken of by Stainton (*Man. of Bh. Butt. and Moths*, vol. II, p. 348.) The hind wings were slate-coloured and had long fringes of the same hue.

The eggs of the moth (obtained by pressure) were very minute, globular, smooth and white. They are dropped probably into the flower head of the plant, for the most careful microscopical examination shewed no opening made by a larva through the glochidate involucre.

On August the 4th, I found the newly hatched larva biting into the side of one of the outer seeds. The seeds at this time were white and tender. The body of the larva was white, waxen, and semi-translucent.

The insects were identified for me by Lord Walsingham and Mr. J. H. Durrant. To them also I am indebted for the correction of the generic name from *Parasia* to *Metzneria*, Zeller.

It may well be asked, How was this European insect advanced to Canada? This probably is the correct answer: At Point Levi there is a quarantine station for cattle; and old country hay and straw are often landed with the cattle; and burs containing larva of the species have, at some time, been landed with the fodder. The Burdock is plentiful on all our roads.

The "Kissing Bug."

One of the strange occurrences that marked the season was the spread of the "newspaper scare" of the so-called "Kissing Bug." The rumour concerning this fabulous insect took its rise in the United States, and was echoed by our Canadian press. All over the country alarming reports were published till the women were afraid to open their bedroom windows lest the bug should gain admittance. At the time that the fever was at its height, an employee of the G. T. R. company residing at South Quebec, took his family for a trip to the Island of Orleans. The day was hot and the man lay down in the shade for a nap. While he slept something bit him—probably a mosquito or a cattle fly. In his efforts to allay the irritation occasioned by the bite, he enlarged the wound. A day or two afterwards his arm began to swell, and he became seriously ill. Herein was confirmation of the kissing-bug reports! The part of the story that was not generally known was, that the day after he was bitten the man assisted in unloading a car full of raw hides for the tanners, and that it was the corrupting animal matter from the hides that had poisoned the wound.

About this time I came upon a group of excited people at a street corner in Quebec. I looked over the shoulders of the crowd and saw a negro who was exhibiting a very fine specimen of *Sphinx Chersis* as the veritable bug. "And this," said he, drawing out its proboscis with a tooth-pick, "is the instrument that it kisses with." A shudder passed through his auditors as they thought of the deadly effects of a thrust from this long osculatory weapon into the soft cheek of Sleeping Beauty.

INJURIOUS INSECTS IN ONTARIO DURING 1899.

By Dr. James Fletcher, Dominion Entomologist, Ottawa.

A few different kinds of injurious insects have attracted more than usual notice during the past season from the farmers and fruit-growers of the province. The keen interest which has been taken in the spread of the San Jose Scale has been at least enough to satisfy even Entomologists, who have been for three years begging fruit growers to believe that the San Jose Scale is not as was claimed, "only an ordinary insect like the Colorado potato beetle and many others." Unfortunately this conviction may have come too late, and the very men who ought to have been seconding the wise efforts of the Government to conquer this enemy by adopting promptly the measures recommended which would have prevented its spreading, are now claiming that the infestation is so widespread that there is no chance of eradicating it and that therefore the Government must stop all extreme measures. This matter has been discussed at length on previous pages of this report so that it is unnecessary to say here more than that the San Jose Scale is still to be considered one of the very worst enemies that the fruit grower has ever had to fight against, that there is no cheap and easy method of controlling it and that fruit growers should make every effort to get suspicious scale insects found on their trees identified, and if these prove to be the San Jose Scale, do everything in their power to destroy them promptly.

Cereals.

Grain crops throughout the province have not been injured to any large extent by insects. The Wheat Jointworm, which last year did some damage, has not re-occurred, and the same satisfactory report may be made with regard to the outbreak of the Wheat Midge, which appeared last year along the shore of Lake Ontario in the Niagara peninsula. The Hessian Fly, that old time enemy of the wheat grower, was rather more abundant than usual in Western Ontario, and letters were received asking as to the best way of preventing loss. Wireworms were troublesome in several places, and some practical treatment to prevent loss by these insects is much needed.

The Pea Weevil has done much harm this year. Farmers and pea growers are careless about getting their seed fumigated, and there are many complaints that this serious pest is increasing. In our last report, at page 78, full instructions were given as to the easiest and best means of treating seed pease to destroy the weevils. They were briefly[1] (1) fumigating the seed with bisulphide of carbon, or (2) the holding over of seed for a year.

The Destructive Pea Aphis (*Nectarophora destructor*, Jnsn.).—By far the most serious attack upon field and garden peas during the past summer was by a previously undescribed species of plant-louse. It is very remarkable that a species should suddenly appear, as this one did, in sufficient numbers to destroy millions of dollars worth of produce in a few days, and that it should have been previously so rare as to have entirely escaped detection and description by Entomologists. Such, however, was the case. The Destructive Pea Aphis occurred in vast numbers in several parts of Canada and the United States. Specimens of the insect and reports of its ravages were received from widely separated places, in a line extending from the Maritime Provinces to the Lake Erie counties of western Ontario, and from the Great Lakes down to the Southern States. The species has been worked up and described by Prof. W. G. Johnson, of College Park, Md., and an interesting account of it by him was read at the eleventh annual meeting of the Association of Economic Entomologists last August which will appear in the report of that meeting. Prof. Johnson said "the growing of peas in Maryland is a very important industry, and reliable conservative authorities place the loss this season at $3,000,000. the principal cause being the Pea Louse. In many cases the destruction was complete, varying from mere garden patches to hundreds of acres." The States in which most injury has been recorded are Maryland, Virginia, North Carolina, Pennsylvania, New York, New Jersey and Delaware.

The two most notable occurrences of the Pea Aphis in Ontario were at Freeman, reported by Mr. G. E. Fisher with specimens, and at Ottawa where the insects were found in large numbers from August until the end of October. The attacks upon field peas at Ottawa were unimportant, but the sweet peas in some gardens were seriously injured. For field peas it is difficult to apply a remedy, owing to the way in which this crop covers the ground, but with Sweet peas, spraying with tobacco and soap wash (10 lbs. of native tobacco leaves and 2 lbs whale oil soap in 40 gallons of water) was found very effective. Many predaceous and parasitic insects were observed at work. On the Experimental Farm larvæ of Syrphus flies and Lace-winged flies were common and beetles and larvæ of the two Lady-bird beetles, *Coccinella 9-notata* Hbst and *Hippodamia convergens* Guer, were extremely abundant, as well as the hymenopterous parasite *Praon cerasaphis*, Fitch. In the garden of Mr. Collingwood Schrieber, in addition to the above, large numbers of a new species of Aphidius* were detected. Unfortunately both the Syrphus flies *S. ribesii*, Fab., and the nine spotted Ladybirds were attacked themselves by parasites; but nevertheless they reduced very materially the occurrence of the Pea Aphis. As well as the above-named, larvæ of a minute dipterous parasite (*Diplosis ?*) and a fungous parasite appeared in small numbers in all colonies of the aphis and doubtless played an important part in bringing down the numbers. The undue increase of the various kinds of plant lice seems to be particularly affected by meteorological conditions, and, as in the past there is no record of serious injury to the pea crop by these insects, there is every reason to hope that we shall not have another visitation similar to that of 1899 for some years.

* Since named *Aphidius Fletcheri* by Mr. Ashmead.

Fodder Crops.

There have been few complaints of injury to fodder crops during the past season, the usual occurrence of "silverstop" on grasses in old meadows was due to the depredations of small leaf-hoppers. Grasshoppers were destructive only in a few localities. In the Ottawa district a considerable quantity of the common red and mammoth clover was injured by the Smaller Clover weevil (*Phytonomus nigrirostris*, Fab) just before flowering in June, but there was no recurrence noticed in the second crop, and as clover is not grown for seed in the district, the injury was unimportant. The clover-seed midge (*Cecidomyia leguminicola*, Lint.) occurred in Western Ontario ; but less complaints than usual were received.

Root Crops and Vegetables.

The various Root Maggots, always so destructive, attacked turnips, onions and cabbages, and, although a certain amount of success was obtained from the use of carbolic applications and the Goff tar-paper disk, nothing new of value was elicited. Dr. W. Gilpin, of Brechin, reports some successful experiments with white-lead applied around the stems of cabbages at the time of setting out. A series of experiments with a diluted application of Jeye's fluid, watered along rows of onions and radishes once a week from the time they appeared above the ground, would indicate that this will prove a useful remedy. Cabbages and cauliflowers similarly treated were also much benefited by this application.

The Diamond-back moth (*Plutella cruciferarum*, Zell.). One of the remarkable attacks of the past season, which was widespread throughout the Province, was by the caterpillars of the Diamond back moth, and occurred upon turnips, rape, and cabbages of all kinds. The injury became noticeable during August, when white patches appeared upon the leaves. Fields of Swede turnips and rape were seen so seriously injured near Stittsville and Ottawa as to look quite white from a short distance, and the crops were materially reduced. The small active caterpillars swarmed upon the leaves, but were found to be attacked by the usual parasite (*Limneria parva*, Prov.). On walking through infested fields the small moths flew up in swarms. Upon the Central Experimental Farm Brussels sprouts were much injured, and rendered unfit for the market by the larvæ eating their way inside the nubs. The habits of the caterpillar render the successful application of remedies difficult ; for the most part they work beneath the leaves, and at the slightest disturbance let themselves down by a silken thread. Remedies which have been used successfully are dry applications, containing Paris green and pyrethrum, or a kerosene emulsion spray ; but all of these must be used promptly on the first appearance of the enemy.

Blister beetles (*Macrobasis unicolor*, Kirby) did some damage to potatoes in the north-western counties ; but as usual their attacks were of short duration, and where spraying with Paris green was practised promptly little harm was done, The closely allied Oil beetle *Meloe Americanus* Leach was found by Mr. J. J. Sheil injuring potatoes at Ariel, Ont.

The Asparagus beetles (*Crioceris asparagi*, Linn.) and O. *12-punctatus*, Linn.) appeared for the first time in Canada during the past summer. The two species were about equally abundant, and were the cause of loss to asparagus growers at Queenston and other places in the Niagara peninsula. These two beetles have been spreading slowly through the United States for some years. The common Asparagus beetle was first noticed in America 40 years ago ; but it was not until 1881 that the 12-spotted asparagus beetle made its appearance, when it was found at Baltimore, Md.

The two species are very unlike. The asparagus beetle is a narrow black beetle about ¼ of an inch in length, very prettily marked ; the head, legs and antennæ are black, the thorax red and the wing cases are black, with six silvery white spots, and widely bordered round their edges with orange red. The marks on the wing covers have sometimes the appearance of a black cross, for which reason it has also been called in England, the Cross-bearer. The 12-spotted asparagus beetle is of about the same length as the above ; but slightly wider, and has the whole body orange-red, with exception of the antennæ, the feet, the knees and 12 black spots on the wing covers—6 on each. As a rule, the latter is

less abundant than the former. The habits of the two species are very similar; but differ in some very important particulars. Those of the common Asparagus beetle are best known. It passes the winter as a perfect beetle, and appears early in the spring, eating into the young shoots when ready for the market, and laying its eggs upon them. These eggs are black and elongated. They stick out conspicuously in every direction from the shoots upon which they are laid. The grubs soon hatch, and are slimy greyish-looking slugs with dark dots, a blackish head and black legs. They frequently do a great deal of harm to young plants. There are two or three broods in a season, and they not only feed on the young shoots, but upon the old foliage of the asparagus. In the case of the 12-spotted species the grubs also live inside the berries. Among the remedies which have proved more or less successful the following may be mentioned: (1) The beating of the beetles and grubs from the plants into nets or broad pans, containing water and coal oil. When collected in nets the insects must be killed by throwing them into scalding water, or water with a little coal oil on the surface; (2) Keeping the beds closely cut in spring, so that no eggs are allowed to be hatched, a few stems are sometimes left for the females to lay their eggs upon. These are subsequently cut and destroyed and other shoots are left to take their place as traps; (3) Spraying the beds at short intervals during the summer with Paris green and water, 1 lb. in 100 gallons of water, will destroy both the larvæ and the beetles; (4) Dusting with lime. It has been found that freshly slaked lime is very fatal to the slimy larvæ, and dusting the beds at short intervals of three or four days is one of the best means of clearing them of the larvæ; (5) The larvæ may also be brushed off the plants with a stick, and if this is done in the middle of a hot day it is claimed that few of them ever get back again, a short time on the hot soil proving fatal.

Fruits.

The San José Scale investigations have been the means of drawing the attention of fruit-growers to many insects which otherwise would have remained unnoticed, and although no new enemies have to be recorded as having done widespread or serious harm during the summer of 1899, most of the regular pests have been observed. Closely resembling the San Jose Scale are three other species, the occurrence and range of which are now much better known, viz., *Aspidiotus Ancylus*, Putnm., *A. Forbesi*, Jnsn., and A. *ostreæformis*, Curt. The last named of these, a European species, was first discovered in America at Chilliwhach in British Columbia; but it is now known to be present in considerable numbers in many parts of Western Ontario and in the Eastern United States. It most closely resembles *A. ancylus*, and has been, doubtless, confounded with that species in the past. Among remedies for scale insects spraying with whale-oil soap seems to be one of the most effective. Kerosene applied in various forms is also very useful. The application of Bordeaux mixture, consisting of sulphate of copper and lime in water, as a remedy for fungous diseases has also been found to be useful against scale insects by rendering the new wood, it is thought, disagreeable to the young bark-lice when seeking for a suitable place to attach themselves to the tree. Some experiments made by Mr. W. T. Macoun, the Horticulturist at the Experimental Farm, in spraying trees with whitewash to retard the opening of buds in spring, seems to add confirmation to this theory. Trees sprayed early last spring with whitewash are certainly freer from oyster-shell bark-lice than others not so treated.

Tent caterpillars were again this year very numerous and destructive in many parts of the Province, notwithstanding an abundant presence of parasites and a bacterial disease which killed thousands of the larvæ. Early spraying, as soon as possible after the young larvæ hatch, with Paris green, 1 lb. in 100 gallons of water to which is added 1 lb. of fresh lime, is quite effective; but if the spraying is delayed until the caterpillars become nearly full grown, they are much more difficult to kill. The egg-masses should always be sought for carefully during the winter and burnt, and a sharp lookout should be kept at the time the young caterpillars hatch so that they may be destroyed when they gather together in clusters after feeding, either in a web or in the case of the Forest Tent caterpillars on the side of a branch.

Among fruit pests of lesser importance which have been reported during the past summer in Ontario the following may be referred to: The Apple Aphis at Meritton, the

Plum Aphis at Dresden, the Pear-leaf Blister Mite at several places, the New York Plum Scale at four different points, the Pistol Casebearer of the apple at Cobourg and Valentia, Pear-tree Psylla at Winona, and an interesting injury to young plums while green by the caterpillars of the Streaked Hair-streak butterfly reported by Mr. W. M. Orr from Winona.

Of rather greater importance and wider extent than the above were injuries by the Currant Aphis, the Imported Gooseberry Saw-fly, the Pear Slug and the Eye-spotted Bud Moth. Mr. J. Van Horn sent specimens of the Fruit Bark Beetle (*Scolytus rugulosus* Ratz) from Chatham. This was first recorded as occurring in Canadian orchards last year.

Greenhouse Pests.

Under this head two new enemies have to be reported. Both were found in the extensive houses of Mr. J. H. Dunlop in Toronto. The Black Violet Aphis (*Drepanosiphum violæ* Pergande), which has been referred to from time to time in United States publications, was found in some abundance. As an aphis this is a beautiful species, although destructive where it occurs in numbers. It has been treated of in a special bulletin (Circular No. 37, Second Series) issued by the U. S. Division of Entomology, where the value of fumigating with hydrocyanic acid gas in greenhouses and cold frames is shown. While testifying to the effectiveness of the common remedy of fumigating with tobacco, it is pointed out that it requires repeated use at short intervals, and that it may even "cause serious injury to plants. In the case of violets, it has been found to be only of slight value against plant lice working in the bud, and, while it may destroy the so-called green aphis when exposed, it is not effective in killing the black aphis. Moreover, tobacco may prove injurious to the foliage and flowers, bringing on epidemics of 'spot.' Tobacco is also useless against scale insects in general and mealy bugs." The bulletin quoted from, is of very great value to horticulturists and others who grow plants under glass, but particularly to violet-growers. Violets are an expensive crop to grow, and this bulletin is the record of experiments which were specially undertaken to overcome the difficulties of treating violets under glass. Full particulars are given as to the methods of applying the remedy and the strength of gas to be used for various crops. The following quotation will illustrate the value of this pamphlet :

"Double English Violets—'Marie Louise,' 'Lady Campbell' and others. For plant lice and general fumigation fifteen-hundredths of a gram of 98 per cent. cyanide of potash for each cubic foot of space is required. The exposure, if made according to directions, will not hurt the plants in any stage of growth. The gas has been used on a large scale in fumigating violets for the past three years with the greatest success, only a few treatments during the season being required. Leaf-eating larvæ, slugs, millipedes, cut-worms, etc., when exposed are killed as well as plant lice. Red spiders, however, are not entirely eradicated by the treament. The foliage of single violets like California and Princess of Wales are sometimes slightly injured by the stronger dose of gas. A weaker dose (one-tenth of a gram potassium cyanide per cubic foot) should be used when they are to be treated.

"Other Plants.—Other plants on which the gas has been tried on a small scale indicate that it may probably have quite a wide range of usefulness."

The other new pest is the caterpillar of a small moth, *Phlyctænia ferrugalis*, Hbn. This is a very slender leaf-eating caterpillar when full grown, about three-quarters of an inch in length. It is of a semi-translucent green in colour, with a double white band on each side of the dorsal vessel and two distinct black spots on the second segment. The head is white clouded on the cheeks with brown When at rest the caterpillar has the habit of curling the head and the first two or three segments round at the side of the body. These caterpillars have done a good deal of harm in Mr. Dunlop's rose houses, and he complains of their working all through the season. The injury seems to be done chiefly by eating the parenchyma from the lower sides of the leaves. The specimens bred from Mr. Dunlop's material were kindly identified by Prof. C. H. Fernald, who also referred me to the article in the Michigan Experiment Station Bulletin, No. 102, by Mr. G. C

Davis, who treats of it as an enemy of celery, in which plant it is said to both bore into the stems, channelling at the base of the leaf stalks and leaving nothing but a shell on the outer side, and also feeds on the leaves, the larvæ being found either rolled up or sewed in between them. Mr. Davis states that Prof. Fernald had written to him that "to his knowledge the species had never been bred in this country before. In an English periodical, Entomologists Monthly Magazine, vol. 14, pages 200-4, all the early stages are fully described. The species was bred on the leaves of Boneset (*Eupatorium*), and was also taken on Hedge Nettle (*Stachys*) and strawberry leaves. It is thought to be two or more brooded."

SOME OBSERVATIONS ON A BUMBLE-BEES' NEST.

By Rev. C. J. S. Bethune, London, Ont.

In the Head Master's garden at Trinity College School, Port Hope, I had planted a clematis in the angle formed by some stone steps and the brick wall of the chapel organ-chamber. In the spring of 1897 I put some cut grass from the lawn at the base of the plant to serve as a mulch and keep the ground moist about the roots. A gravelled walk ran parallel to the building at a distance of about a yard, with a branch at right angles to the stone steps; between the clematis and the walk there was a densely growing young lilac tree. The creeper grew with great rapidity and I found it necessary to support it with wire netting. One day when putting this up, I noticed that whenever I touched the cut grass there came from it an ominous bizz-z-z. I thought it was only a Queen Bee looking for a deserted mouse's nest, but subsequently discovered that the "bizz" was always there when I poked the grass. Later on the worker bees were to be seen coming and going, and there was always a sturdy sentinel at the entrance to the nest. My man-servant, who did not by any means share in my interest in all things entomological, wanted very much to destroy the nest as he was afraid of being stung by my friends the bumble-bees, but I would not allow him to do so. He then tried to drown them out when watering the lawn with the hose, so I protected them with a slanting piece of slate, which left a space between the top of the nest and its new roof.

One day in the middle of summer I dropped some bits of cut grass beside the slate, and found that the bees soon carried them off inside; I then gave them more and watched to see what they would do with it. Two of them apparently attended to this work, and they were most industrious, never seeming to stop throughout a long summer's day. The outside bee would run about, seize a bit of grass and pass it swiftly between his legs, under the length of his body, backwards,—and then another, and so on, till he got it all near the opening at the end of the slate—the end opposite to that at which the family went in and out. He then began again at the little pile that he had collected, and passed the bits of grass in to his companion under the slate—always sending them between his legs backwards. It was most interesting to watch the operation, and I paid frequent visits to the nest during the day to see how it was going on. After a time that opening was pretty well filled up with grass and the workmen took a rest.

Though bumble-bees were visiting the flowers close by until late in October, I very rarely saw one go in or our of my nest after the middle of September, and felt strongly inclined to think that my man must have drowned out a good many of the colony. He never neglected to water that clematis! I was quite grieved when one day I found my friend the door-keeper dead just outside the entrance, where he had so faithfully done his duty during many long summer's days. This was after some chilly nights, when there had been a slight touch of frost.

Towards the end of November, long after any bumble-bees were to be seen in the garden, I dug up the nest in order to send it to Dr. Fletcher, who wished to see whether there were any parasites affecting the bees. I found that the bees had done a good deal of excavation and gradually hollowed out the place for the nest till they had sunk it so that the top was level with the soil—it was started originally on the surface. They must have dug a hole at least three inches deep the whole size of the nest. The earth

was brought out in pellets and formed into a neat little embankment, or causeway, against the wall, leading away from the entrance. They were a very orderly and peaceable family, and never annoyed any one, though passers-by were frequent along the gravel path not a yard away, and up and down the stone steps at the end of the nest.

It cannot be too often repeated that bumble-bees are decidedly useful insects, and do much good work for farmers and fruit-growers. Their hairy bodies are specially adapted for carrying pollen from one blossom to another, and thus they are instrumental in fertilizing many varieties of fruit-trees, melons, cucumbers, pumpkins, etc., clover, red and white, and various flowers, many of which would be unable to produce any seeds but for the kindly offices of bees.

THE NORTH-WEST (CANADA) ENTOMOLOGICAL SOCIETY.

The First Annual Meeting of the North-West (Canada) Entomological Society was held at Lacombe, Alberta, N.W.T., in the Agricultural Hall on Tuesday, the 7th November, 1899. At the request of the President, the chair was taken by Griffin Fletcher, Esq., J.P.

Agriculturists were well represented. The minutes of the last ordinary meeting were read and approved. Letters were read from Mr. J. A. Guignard (in the absence of Dr. James Fletcher); Dr. L. O. Howard, of Washington; the Bishop of Calgary and Saskatchewan: Dr. Sanson, of Banff; F. Oliver. Esq., of Edmonton, M.P., and a very large number of other gentlemen interested in the work of the Society, expressing full sympathy with its objects.

The Chairman, in a few opening words, explained that the object of the meeting was to popularise the Society amongst farmers, by showing the use of Entomology and Botany, and that a number of gentlemen had written special letters with advice, which would be read after the addresses on the agenda had been delivered.

The Chairman then called upon the President, Mr. Percy B. Gregson, to address the meeting. (See page 114).

The President then read an address by the Revd. C. J. S. Bethune, D.C.L., upon "The Use of Entomology."

An address from Mr. H. H. Lyman, M.A., (the President of the Entomological Society of Ontario), was next read.

The suggestion in Mr. Lyman's address as to affiliation of the North-West Entomological Society was discussed, and it was decided that at present affiliation was impracticable, owing to the somewhat original course adopted by the North-West Society, (of which details appear in the Report of Council).

An address by Dr. Henry George, M.R.C.S. (Eng.), of Innisfail, Alta., on "The Pocket-Gopher," (G. bursarius) was next read by the President.

Numerous letters in support of the President's course of procedure were next read from members of the Society, among them being a letter from The Bishop of Calgary, in which His Lordship (after remarks as to the uphill work before the Society) advised quarterly meetings, to which the public should be specially invited; a letter from Mr. E. Firmstone Heath cordially supporting the President's project of giving sketches of insect life to the school children and parents, and of holding quarterly meetings for interchange of experiences; from Mr. A. W. Hanham, Mr. F. Oliver, M.P., Dr. N. B. Sanson, of Banff, Alta., and several other gentlemen to the same effect.

Mr. Hanham and Dr. Sanson suggested the formation of a "Naturalists' Club," but, in view of the scattered community, it was decided to be impracticable at present; but that a suggestion by Mr. Heath that some kind of Natural History Periodical might be published eventually by the Society, which would be circulated among the public, should be seriously considered at the earliest opportunity.

A letter from Mr. C. W. Peterson Deputy Commissioner of Agriculture, Regina, was then read, in which he remarked among other things upon the importance of investigations into the insect life of the country, and mentioned an estimate of damage done by insects to crops of the United States at $300,000,000 per annum, and concluded with expressions of the Commissioner's appreciation of the President's efforts to create an interest in Entomological and Botanical matters in Alberta and the Territories.

A letter from Dr. L. O. Howard was also read, in which, after wishing success to the President's work, Dr. Howard remarked that though the actual value of this class of work could not fairly be reckoned in dollars and cents, yet that there was no doubt that hundreds of thousands of dollars were saved to the farmers of the United States every year by the carrying out of the recommendations of the State Entomologists. Dr. Howard also, in approving of the encouragement of nature study in the local schools, advised the display of insects characteristic to the locality.

The Chairman then read the Report of Council.

The election of fresh members then took place; and the election of officers for the ensuing year; Percy B. Gregson remaining President of the Society.

The Rev. Matthew White, of Lacombe, was elected Vice-President: Arthur D. Gregson, J. P., of Waghorn, the Librarian-Curator; Percy B. Gregson, the Secretary-Treasurer; and the Rev. J. Hinchliffe of Red Deer, Alta.; William Wenman of Red Deer; T. N. Willing of Olds; and F. H. Wolley-Dod of Calgary, as Members of Council.

Before conclusion of proceedings, Mr. C. T. Daykin announced to the meeting that the President had already arranged to give every month at the Waghorn School-house a short sketch on the life of some insect, or of some other phase of nature, and its economic value, and the date would be published in newspapers in time for every one to attend, and the sketches would interest not only the young folk but "grown ups."

The Chairman then read a letter just received by the President from Mr. Arthur G. Wolley-Dod (Vice-President of the Calgary, and Secretary of the Fish Creek, Agricultural Societies), requesting the President to prepare a short treatise on insects and their value as regards agriculture, which he could read at the forthcoming Agricultural Societies' annual meetings in December.

The Secretary of the Lacombe Agricultural Society also requested a paper by the President for reading at the December annual meeting of the Lacombe Agricultural Society.

After a vote of thanks to the Chairman, the proceedings terminated.

Report of Council.

In submitting its First Annual Report, the Council take the opportunity of recording their sincere expressions of gratitude to the many gentlemen high in the Entomological and Agricultural worlds for their sympathy—their actual co-operation—with the work of the North-west (Canad Entomological Society. The Society has embarked in an enterprise in a distant and comparatively unknown land, whose settlers are pioneers and from many parts of the globe, and untutored; and the advantage to the Council in having advice from such men as the Founders of the Entomological Society of Ontario, Dr. James Fletcher, Dr. L. O. Howard, and Mr. C. W. Peterson, cannot be overvalued.

The Society's Collection of Insects has been greatly augmented by gifts from Dr. Sanson, of Banff; Dr. Herman Strecker, of Reading, Pa.; and Dr. Henry Skinner; and other gentlemen, including Messrs. W. Wenman, E. F. Heath, T. N. Willing, H. Hutchinson, A. W. Hanham, and A. J. Dennis have kindly promised examples representative of their respective districts. The Society's Collections are always on view to the public.

Mr. E. Baynes Reed, the Rev. Dr. Bethune and Prof. James have presented to the President the entire set of Reports of the Entomological Society of Ontario. Dr. James Fletcher, a full set of his Reports since the establishment of the Ottawa Experimental

Farm; Dr. Howard, a large number of Reports and publications of great value (bound and unbound) from his Department; and to these the President of the North-West Entomological Society has added a number of other works on Entomology, Botany, and Geology.

The Council, noting the large influx of immigrants into Alberta from all lands (Swedes, Bohemians, Galicians, Russians, Norwegians, etc.), realises their great need for a right apprehension of the value of economic entomology.

The Council begs to tender the reason for the absence of a balance-sheet and statement of expenditure:—In founding the Society the President elected to defray every expense, until its objects should have become appreciated, and a course of procedure formulated. The kind recognition of the value of such a Society in the North West, coupled with much practical advice, has made the way the President should pursue clear and defined, and a way which has received the fullest approval. Pursuing strictly this course, the President of the Society purposes to give a monthly sketch in the local Public Schools before the children and their parents on insect life or other phase of nature and its economic value; and to call quarterly meetings at different points of the members of the Society, to which the public will be specially invited, for interchange of experiences, etc., and receiving accounts of new insects and weeds; and to submit short papers for reading and discussion at the meetings of local Agricultural Societies.

Presented on behalf of the Council.

PERCY B. GREGSON,
Secretary-Treasurer.

7th November, 1899.

ADDRESS BY PRESIDENT OF N. W. ENTOMOLOGICAL SOCIETY

Ladies and Gentlemen, and members of the North West Entomological Society:

A year ago a few of the members of this district felt that the time had come when the insects of this great North-West should receive more attention. With the spread of immigration "bugs" and "grubs" of various sorts had also spread westward, and the greater part of the country itself was practically unexplored, as far as insect or plant life was concerned.

We met, therefore—a few of us—and the outcome of the meeting was the formation of the North-West (Canada) Entomological Society. We have been exceptionally favoured in having the sympathy and advice of men of large experience and influence: I allude to Dr. James Fletcher, the Dominion Entomologist; to Prof. James, Deputy Minister of Agriculture for Ontario: to Mr. C. W. Peterson, our own Deputy Minister of Agriculture; the Bishop of Calgary; Mr. Oliver, M.P.; Mr. Simpson, M.L.A.; Mr. E. Baynes Reed, the Government Meteorologist at Victoria; the Reverend Dr. Bethune, Editor of the Canadian Entomologist; the Reverend G. W. Taylor, Government Entomologist for British Columbia; Mr. H. H. Lyman, President of the Entomological Society of Ontario; Mr. Young, Editor of the Calgary Herald; Dr. Herman Strecker, and many other gentlemen (all of whom are members of the Society). By the generous gifts of Mr. Reed, Dr. Fletcher, Dr. Bethune, Prof. James and Dr. L. O. Howard of Washington (The Government Entomologist for the United States) a nucleus for a good library has been formed. Other gentlemen, including Dr. Sanson, of Banff, Mr. T. N. Willing, and Mr. E. Firmstone Heath of Manitoba, have donated insects, and we owe to the generosity of Mr. Edmond a serviceable working microscope.

So much for the introduction of the Society, but before proceeding to the object for which this meeting has been called, I wish to publicly and most sincerely thank the number of gentlemen who have been so kind as to write, with assurances of their continued support and sympathy with my efforts, while regretting their inability to attend this meeting. These letters will be read presently.

We now come to the objects of this meeting, and I am very heartily glad to see so large a gathering. The question I am most frequently asked in connection with this

society is ; What is the use of it? This is a practical age, and farmers cannot afford to look at anything they have no use for. Now, an entomological society is simply another name for a society of persons who are making some sort of observations about insects—not merely butterflies—but grubs, bugs, worms etc., and the points I wish to show are, that some knowledge of insects is very important to all of us who are engaged in agriculture, so that we may rightly distinguish between our insect friends and our insect foes ; and some knowledge of insects is also necessary in order that the farmer may know how to deal with his insect foes, and how to make the most of his insect friends.

Now to see how to deal with insect foes, we must first of all learn something about them ; there are many, like the Hessian Fly, whose grubs do all the harm and many others, who themselves as well as their grubs do the harm, like the Colorado Beetle. Insects that themselves do harm, do so by mouths that bite or mouths that only suck. Those that bite have jaws, with which they bite off solid pieces of food from the plants or annimals they attack. Some poisonous material must therefore be placed *on their food*, so that when this food is eaten by the insects they may be destroyed by the poison. Those insects that suck, have no jaws, but sharp hollow beaks through which they suck the juice of the plants or blood of the animals they attack. For sucking Insects it is therefore useless to place poison on the plants, because, having no jaws, they only feed on liquids such as juice or blood, for which they have to sink their beak-like tubes beneath the surface of the object attacked. For this class of insects, substances, which kill by coming into contact with the bodies must be used, e.g., kerosene and soap emulsion, or oils, which stops up the breathing organs, The losses in agricultural products from insects and their grubs is reckoned at fully ten per cent.

A few of our common insect foes in this country are pretty well known. There is the red turnip beetle, which destroys our Swede turnips [example of Entomoscelis adonidis Fab, produced and handed round]. The little turnip "fly" which destroys the young turnips when in first "leaf". These "flies" are really little beetles, and, like all beetles, pass through the grub and chrysalis stage, so that if we learn the probable date for hatching (for all insects are very regular) we shall know when to sow the turnip seed—They should be sown either sooner than the beetle hatches, so as to get their second or third rough leaf before it hatches. or they should be sown so much later than the hatching time so that when the "flies" hatch they have to starve. And we must now, it seems, look out for the Colorado beetle, or potato bug. It has appeared in two or three places in Alberta this summer, and last year was injurious in several parts of Manitoba. The red turnip beetle is sometimes mistaken for it, but the potato bug has ten stripes altogether, and the red turnip beetle has only three, but both are destroyed by the same treatment (Paris green solution).

Now, all the insects I have mentioned have jaws, so that they are "biting ' insects, and the remedy against them is to sprinkle poison on their food.

Then there are the grubs that work underground or at the surface of the soil. We all known the garden "cut-worm". This is a caterpillar, which eventually developes into a very common moth that flies about our lamps and windows in the fall, and which is easily caught and destroyed. When in the "grub" stage, it is very destructive to our young cabbages and other young plants. It lodges during the day just under the soil—you can find it in the mornings by the small hole it leaves in the ground near the plant it has attacked over night. They come out only at night, and then they nibble through the small stem of the plant, and sometimes draw the leaf down into the soil to consume at leisure. Now these grubs are very fond of bran, so that a little damp bran with a very small quantity of dry Paris green stirred in (proportions 50 to 1) will be sure to destroy them, or wrap paper round your cabbages when you plant them out. Another very common grub in our potato patches is the wire-worm. These are a nuisance in the way they work into our best potatoes. The wire-worm lives in the ground through the winter, and in the spring, after going through one more stage (pupa), develops into a small brown or black beetle, called a "click" beetle, because when the beetle is touched it gives a quick spring away. These beetles we should learn to recognize as our foes, and should kill them all on sight, because it is from their eggs that the next crop of

wire-worms will come. And so we see that by knowing the life history of these things we get a double shot at them. We kill the worm, and we also know its parent, the "click" beetle, and kill it.

Among the *sucking* insects are various kinds of lice. They have only long beaks, for sucking, but no jaws. We find them on animals and plants, and as they get their food by sinking their beaks (which are as sharp as a very fine needle) through the surface, any amount of poison on the surface will not kill them, so the way to attack them is by something that will stop up their breathing organs and suffocate them, *e. g.*, coal oil emulsion, tobacco decoction or smoke. And so there are many other insects which we soon learn to recognize as foes, and by knowing their habits and how and when they breed, we can learn how to deal with them. There are foes all around, grubs eating our poplar and other trees, our fence posts, spruce trees, etc.

To come now to our insect friends. We have many among our ordinary beetles, and whenever we recognise any of our friends among them we should be careful not to destroy them. In our gardens and fields there is a beetle called the "fiery" beetle, which has six rows of bright bronze spots on each wing cover. This insect in two of its stages (grub and beetle) feeds on the cutworm and wireworm. It attacks the cutworm so eagerly that it is often called the "cut worm lion beetle." [Specimen of Calosoma calidum, Fab., handed round]. Then there is a smaller beetle (black) called the "ground beetle," which also feeds on cutworms, etc. [Specimen of Harpalus caliginosus, Fab., handed round]. The "tiger" beetle is also a great friend of ours in that way. [Example of Cicindela vulgaris, Say, handed round]. And the familiar little "lady-bird" (of which there are several varieties) lives on nothing else but our insect foes. It's "grub" devours wholesale the young plant lice and the young of turnips and potato bugs. Wasps, too, are among our insect friends and all "dragon flies." Besides these and many other of our friends which we can see every day, there is a host of minute flies, whose grubs feed upon our enemies and should not be recklessly destroyed.

A good general agricultural remedy is summer fallowing, as it starves the insects, and exposes them to birds, etc. You might try a small patch next year, and see the effect. Then late fall plowing will turn up to the frost and so destroy hundreds of wireworms and other grubs. We have also many friends among our common birds, such as jays, crows, and all sorts of wood-peckers. Wood-peckers never attack a tree, either dead or alive, unless there are grubs first eating the tree, and it is to get at these that they peck the trees at all. Their long tongue works into all the cracks of bark, etc. And this year there has been an unusual number of toads. Toads do no harm and feed almost entirely upon insects, and should be carefully protected accordingly.

Among our enemies too is "smut," though this is really a fungus. This is a fungus on grains, and, while always a pest, is rather more prevalent this wet year than usual. The bad features of "smut" are that it lowers the standard of purity in the flour, and it takes away from the profit of the crop. A deduction of 8 p.c. is a fair estimate of the loss from smut alone to the farmer, and the worst of it is a "smutty" plant does not thin out the stand and give the healthy plants more light and soil. It takes up just as much room, and requires as much nourishment and moisture from the soil as do the healthy ones. One single germ of smut coming in contact with a healthy grain will infect it, and smut germs are easily blown about by the wind, or carried from field to field by threshing machines.*

It often seems strange that there should be in the ground so many cutworms and other grubs, but this would not be the case if the land were kept perfectly clear of weeds. Weeds, such as Lamb's quarter, are their natural food, and where these grow the insects naturally go in order to lay their eggs, which hatch into the grubs.

*Note—In answer to several enquiries at the meeting as to the remedies to prevent smut, I gave the general formula advised by Dr. Fletcher in ordinary cases, viz.: Dissolve 1 lb. of bluestone in a quart of hot water, which is then sprinkled by one person over 10 bushels of wheat or barley, placed in a wagon-box, whilst some one else keeps the grain well stirred. Oats should be *submerged*, not sprinkled only.

There has this year appeared among us for the first time a tiny grey "plume" moth, whose larva is very destructive to clothes, furs, sacking, etc., and whose presence in this country can only be accounted for by coming with outfits of new settlers.† It will be interesting to see if it reappears next year. The moth is in great abundance, and if its eggs hatch next spring, it will become a troublesome household pest, and we can only hope that a dry year will exterminate it. We know that many insects and the grubs of others stand extreme degrees of cold. In this North-West they often endure 50 or 60 below zero without injury, so that we cannot rely on winter to destroy them. If they reappear, we must be prepared with a remedy.

I thank you, Ladies and Gentlemen, for having heard me so patiently, and I come now to the suggestions I have to make. The large immigration that is being attracted to this country is in one respect a source of danger, because there is always a liability of any new settler inadvertently introducing a new weed, or a new insect, which may turn out to be a pest. We should therefore be on the watch, and that is one of the reasons why I have invited so many agriculturists to join an entomological society. I wish the heads of all our agricultural societies to become members, so that by personal intercourse, by correspondence and quarterly meetings (which I will try to hold at different points along the line), we can keep in constant touch with each other, and the presence of any troublesome or new insect or weed in any locality can at once be ascertained and kept under control before it becomes aggressive. We have already on our members' roll agriculturists scattered throughout Alberta and Manitoba, and on the roll are the Presidents or Secretaries of our own (Lacombe) Agricultural Society, and of that of Red Deer, Innisfail, Calgary and Fish Creek, and I hope soon members of other agricultural boards will join.

Many of our leading members wish the Society to issue a small periodical magazine, and it seems to me that we might do so every quarter. This magazine would, with other matters of interest to the farmer, mention new insects or weeds affecting us, and sketch the life history of some insect or animal or trace the progress and effect of some weed, or treat of some other phase of natural history, and be circulated in the country.

Another suggestion I have to make, which is, that the young folk of this country might be made to take an interest in the flowers and insects they see around. They would soon understand their value as affects agriculture. The young are the coming generation, and what they can learn now about these things will stand them in good stead when they are older. They will soon take a real interest in these things. It will be like a new world to them, a world peopled with hundreds of different forms, and every one of which will have a beauty and interest of its own. The powers of observation of our children would grow, and every spark of knowledge they gain of insects and plants would make them fitter men and women.

This brings me to the answer of the question with which I introduced this Society. The question I asked was:—"What is the use of an Entomological Society?" In mentioning certain insects I have alluded to certain remedies, and, though there are certain standard remedies now very well known, they are the outcome of many trials and experiments by people who study these things. In most instances of insect pests their entire life history has to be observed, and the various stages they pass through and their habits carefully investigated. And we must remember that although we ourselves may know how to deal with insects (both foes and friends), there are thousands of immigrants from foreign lands now settling around us who have never heard of any remedies against insects. There are Galicians, Russians, Finlanders, Swedes, and many others. These will have just the same insects to contend with as we have, and it is our privilege—even our duty—to see that they also are made acquainted with our tested remedies, and methods of dealing with them.

The Society is, however, not confined to the economic side of entomology and botany. It has been organized also to collect and investigate insects of various orders.

†Genus *Alucita*, Linn.

The field of its operations is very little known, and we hope that in course of time the society will be in possession of a collection of rarities from districts hitherto unexplored, which will be contributions to science. We hope, through our members, to extend our researches further north and north-west next year, and to gradually increase our field, and any discoveries made will be recorded in one common centre and published from time to time. There are very many boreal and arctic insects whose life histories are unknown, and these as far as possible the society will endeavour to work out. Of course at present we are a small body, but everything must have a beginning, and we hope and believe that, with loyal and earnest members, the Society we now are is but the nucleus of one which will be of much use both to science and to the Canadian farmer.

PERCY B. GREGSON,
President.

THE USE OF ENTOMOLOGY.

BY THE REV. DR. BETHUNE, LONDON, ONT.

Everyone interested in the cultivation of the soil, whether for profit or pleasure, every farmer, gardener and fruit-grower, will require but a short experience to convince him that he has a hard and never-ceasing battle to fight in order to reap a due reward from his labour. After he has duly prepared his ground and put in his crop, of whatever kind it may be, he is sure to find, before it comes to maturity, that there are many enemies who will try to rob him of a large portion of the fruits of his toil. Oftentimes there will be no visible token of their presence until the ingathering reveals a diminished or damaged return; in other cases injury will be apparent, but the enemy who wrought the mischief cannot be seen, the mysterious foe is working by night, or contrives to hide himself so completely from observation that only the destructive results are apparent, while the culprit keeps out of sight.

It will readily be guessed that the enemies I refer to are injurious insects. Their name is legion and their numbers are as the sand of the sea shore. Every plant that grows, whether great or small, is liable to attack—it may be in the roots underground, in the stem or trunk, in the bark or wood, in bud or leaf or branch, in blossom, seed or fruit, and after the grain has been safely housed or the fruits and vegetables stored for the winter's food, there are still foes to be fought, insect enemies to be guarded against.

With such myriads of minute creatures to contend against, working in such diverse manners, the contest might seem a hopeless one, and indeed it would be were it not that nature has imposed her own limitations, and no single insect foe is long allowed to pursue its way unchecked. Where we have to deal with species native to the country, we may feel sure that however much the injurious kind has been allowed to multiply and spread, it will not be long before the balance is restored and the damages reduced to an average amount. But when we are invaded by species introduced from a far distant land, especially those brought from across the seas, the case is usually very different. The enemy arrives in our midst, unaccompanied by the predaceous insects, parasites or diseases that keep down his numbers in his place of origin, and he rapidly increases and multiplies without let or hindrance, until artificial means are employed for his subjection. In such cases the farmer or fruit-grower may suddenly find himself confronted with a mischief worker whom he has never seen before, and with whom he has no idea how to wage a war. His plight may be a serious one, and his losses more than he can bear; he knows not what to do nor where to turn for relief. Hitherto, in Alberta, there has been no help at hand, but now we may rejoice that measures have been taken to give assistance and advice wherever they may be needed. The North west (Canada) Entomolcgical Society has been organized mainly for the purpose of doing good to all the dwellers in the Territory who are employed in the cultivation of the soil. It is their business, and also their pleasure, to study the insects that dwell in the land, to trace out their life-histories, watch how they work, learn their habits, whether they are noxious or beneficial, or simply

beautiful, and then to study and experiment upon the best means of getting rid of the enemy and encouraging the friend. It will help on the cause very greatly if every farmer will take note of the insects affecting his crops and give all the information he can to the Society ; and also send specimens of both the creature and its work.

The entomologist does not pretend to a universal knowledge of insects, but he can usually tell at a glance whether a specimen belongs to a good or evil tribe, and if it should be new to him he can always apply to his correspondents in other parts of the continent for the information that they have been able to acquire. Science knows no political or geographical boundaries, and help may be sought and will be promptly and cheerfully given whether the application is made to the entomologist in charge at Ottawa or Washington. In your case you have the satisfaction of knowing that this department at Ottawa is in the hands of Dr. James Fletcher, who has often visited the North-West Territories and made himself familiar with the most important of your insect enemies. Should the local members be puzzled over some new importation or immigrant they may feel sure that any assistance they require can be obtained from Dr. Fletcher. But they do not by any means intend to be dependent upon one who is many hundreds of miles distant ; they mean to be up and doing for themselves and to spare no pains till they get toknow as much as they possibly can about the insects that infest the country round them.

The ordinary entomologist is often looked upon by his acquaintances as a somewhat silly person who devotes much of his time to chasing butterflies and searching for bugs and beetles, but this is work that has to be done. We must collect the insects in our neighborhood and study them before any progress can be made—we must find out their names and the families to which they belong before we can make use of the records and observations of others ; we must rear them through all their stages and watch their habits before we can be sure what remedies will be available against them. It is a vast, and endless work, one that may well engage a multitude of enthusiastic students and which should enlist the co-operation of every farmer and gardener in the land. Every one may help by keeping his eyes open and making known his observations to the members of the Society. Any unusual visitation of insects, whether as regards numbers or effects, should be at once reported, and the results of any experiments placed on record. Insects should by no means be ruthlessly destroyed unless in the form of caterpillars, grubs or plant lice, they are found in the act of devastation. There are many kinds that are really the farmer's best friends, and it would be a sad mistake to slay the benefactor with the wicked. This shows the necessity of a little knowledge of the subject ; every one, for instance, ought surely to know that a lady-bird is a most useful destroyer of plant-lice, and so, also, is a Syrphus and a lace-winged fly, and yet how few there are who would recognize the two latter if they saw them. A beginning ought to be made with the children. They take an instinctive delight, as a rule, in living creatures and are charmed to learn something about them. An hour a week at school devoted to the elements of entomology and botany in a practical form would be of untold benefit in the course of subsequent years.

I have only attempted in this paper to give a brief outline, in general terms, of some of the benefits to be derived from the study of entomology ; those who are on the spot can enter into details and discuss the special insects that are present causes of anxiety. I would only say further that entomology means money—means dollars and cents lost or saved to the farmer, fruit-grower and gardener. If the Hessian-fly has this year, as is reported, destroyed in some cases 25 per cent., and on the whole from 5 to 10 per cent. of the vast wheat crops of Manitoba, just think of the millions of dollars that that means ! What more useful work, then, can be undertaken than the effort to save at least a portion of this immense sum ? Entomology can do it, if the farmers will only believe it, and adopt the measures that its experience in other regions has proved to be effective. The expenditure on the part of the government of each Province or Territory of a few thousand dollars a year in securing the services of a trained entomologist and in disseminating broadcast the requisite information would enable the whole of the farming community to unite in an intelligent plan of campaign against the common foe and clear their fields of

the insidious pest. If a pack of wolves were to come down from the mountains and ravage the flock and herds of the community, carrying off and destroying one-tenth of the cattle and sheep, it would not be long before every man in the country who could fire a gun and ride a horse would be in hot haste to join in a fierce onslaught upon them. Why should there not be an equal effort and an equal determination to get rid of an insect enemy that causes the loss of just as great an amount of most valuable property? In the one case there is, to be sure, the instinctive love of the chase and all its attendant excitement, while in the other there is the humdrum adoption of some special date of ploughing, some particular variety of seed, some careful burning of stubble, some extra cleaning of grain,—perhaps some little expense, not for powder and shot, but for remedial applications.

There is another side, also, I am glad to learn, to the North-West Entomological Society. It is paying attention to practical Botany, and also to Geology. The latter, to the ears of most, conveys the word *gold*, and I need not, therefore, refer to the value of it,—but all I have said about the study of insects applies equally well to that of weeds. The one are as ubiquitous as the other, and it is quite evident that over the vast prairies of the North-West, with their rich soil and luxurious vegetation, weeds are going to prove as tough a problem as the worst of our insect foes. Here, too, all can do something—all can co-operate. No man should be permitted to let his neighbour's fields be sown with the seeds of weeds that he has been too lazy or too careless to cut down. But many weeds are blown for miles across the land and have to be dealt with in various ways. These are matters to be studied and objects upon which experiments must be tried,—and here, too, comes in the necessity of some education, some elementary information by means of which a noxious weed may be distinguished from a useful or a harmless plant.

I am writing from a long way off and to dwellers in a land that I have never seen, but in matters of science distance makes no difference. We are all brothers in search of truth. We are all at one in our desire to help each other in any way we can—to lessen the toil and cheer the labours of those who are preparing the way for a rich and prosperous community, a goodly province in the Empire of our Queen and the Confederacy of our Dominion.

ADDRESS BY DR. HENRY GEORGE, M.R.C.S., ENG., L.R.C.P.

Mr. President, ladies and gentlemen, and fellow members of the Northwest Entomological Society, I am glad to greet you. As long as I have been in Alberta—some ten years—I have looked forward to this time, when men are ready to use both brains and eyes, and not merely till the ground and perform various other labors in these almost wild parts of the world.

I take it that the chief object of this Society is to enable the farmer to distinguish between his friends and enemies, as relating to his crops, grasses, domestic herds, &c. Birds, animals, insects, weeds, are all under this head; and it behoves us to help our Secretary in his praiseworthy endeavor to make us understand and learn how to distinguish between what we should destroy as vermin and what we should protect as beneficial to the agricultural interests.

I may say that the love of observing nature has been born in me, and when I came out here and heard a man called a "bug hunter" I was much insulted, as I had never before connected that obnoxious word with anything except the little insect that disturbs night's slumbers in some cases. But I might bring these remarks to an end as the Secretary has kindly asked me to pick out some animal or bird and give you my observations and readings on the same. I am going to give you a few words on the

Pocket Gopher. (*G. bursarius*).

This animal is like the English mole in many respects, but differs in others. Like the mole it lives underground and throws up small heaps of fine earth, having "runs" nder the ground. Its fur, both in texture and color, is very similar. It looks like a

large mouse ; is thick set, with a short tail, almost devoid of hair. Its claws are long for digging, but are not shaped like the mole's; also, its teeth are quite different, showing that they live on different diets. The pocket gopher is essentially a rodent, i.e., one of the gnawing animals, having the four inscisor teeth long and like chisels, whereas the mole has regular flesh eating teeth, and is insectivorous chiefly in its diet. The reason this is called "pocket" gopher is because it has on each side of the mouth two pouches which are just like the fingers of a glove when turned inside out. They are outside the mouth, so that when filled have to be emptied by the forepaws which press out the contents. These animals are more destructive than useful, and though I have no doubt that they kill many insects yet they chiefly live on roots of grass, grain, &c., also are fond of potatoes, carrots, and most of the farmer's root crops. They chiefly come up from the ground in the twilight and form one of the chief foods of the long-eared and short-eared owls. I have seen them in the day-time but rarely. I understand that one of the best ways of catching them is by putting a trap in the "run" between two heaps of earth. This is one of the farmer's foes and wants destroying. It's heaps of earth are unsightly, and do harm in covering up grain and seeds too deep; their "runs" take away earth from the roots of grass, grain and shrubs, and lastly they eat and destroy root crops.

With many thanks for listening to these few words, I must conclude; but I hope to see this Society progress and take its place as one of the first scientific societies in the great North-west of Canada.

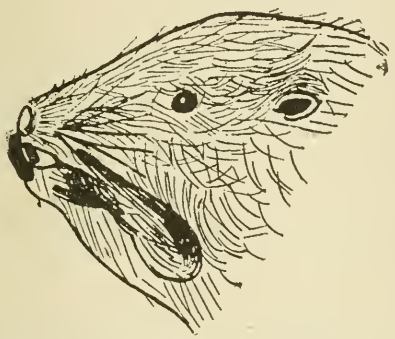


FIG. 65.—Head of Pocket Gopher. Life size.

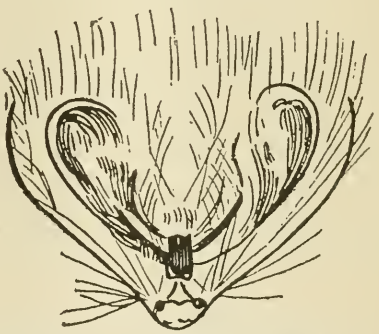


FIG. 66.—Underside of Gopher's head, showing the "pockets."

ADDRESS BY MR. HENRY H. LYMAN, MONTREAL.

GENTLEMEN.—Your President, or should I not rather say our President as I also am enrolled as a member of the North West (Canada) Entomological Society, has asked me to contribute a paper on the best means of furthering the aims of the Society, for the annual meeting.

Living so far east from the headquarters of the Society it is not easy to be fully aware of the conditions under which the work is carried on.

In our Montreal Branch of the Entomological Society of Ontario we have only about 20 members, but as all but one or two live in Montreal or the surrounding municipalities it is easy for us to get together, and we usually hold eight or nine monthly meetings during the winter season.

These meetings are generally held at the house of the President, but sometimes at the houses of other members or in the Natural History Museum. When held in private houses we generally have some refreshments, such as coffee and cake, or lemonade, etc., and social conversation after the adjournment of the meeting.

Probably the holding of such meetings would not be practicable in the case of the North West Society, on account of the members being too much scattered.

For myself, not being an agriculturist, I must confess that my interests lie more on the purely scientific side of the subject, but doubtless you are more interested in the practical side of the matter and desire to know how best to fight the insects which are always attacking your crops.

The first suggestion that I would make is that you should join the Entomological Society of Ontario as a branch, as the benefits to be derived from such union are very great as I think I can show you.

Membership in the Society only involves an annual subscription of one dollar per member, half of which sum is retained by the Branch for its own expenses, while the other half is transmitted to the head office at London, Ont. This, surely, is a very moderate subscription when the benefits received are considered, and I would now invite your consideration to those benefits. In the first place each member of the Branch becomes a full member of the Society with all the rights and privileges. Each member receives regularly the monthly journal of the Society, the Canadian Entomologist, which, though a highly scientific magazine, always contains something of interest even to the tyro. Each member also receives the Annual Report of the Society, and this will probably be the most important consideration to the majority of the members, especially as the value of this privilege has been greatly enhanced of recent years as Prof. James, the Deputy Minister of Agriculture of Ontario, has adopted the practice of sending to all members who are not in arrears a bound volume containing not only the Annual Report of the Entomological Society but also the Annual Report of the Fruit Growers' Association of Ontario and the Annual Report of the Fruit Experiment Stations of Ontario. The volume for 1898 recently distributed contained altogether 403 pages fully illustrated and of great interest and value to agriculturists and fruit growers.

And while the advantages of belonging to the larger society are so great there are no disadvantages. The North West Branch would be still as free as it is now to manage its own affairs, and would have the advantage of all this valuable and popular agricultural and scientific literature, and if this suggestion were adopted the membership of the Branch could be divided into honorary and regular.

As every year Dr. James Fletcher, the Entomologist and Botanist of the Experimental Farms, makes a trip through the Northwest Territories, I would suggest that if possible the Society should receive from him an annual lecture under the auspices of the Society.

One other suggestion that I should make is that those who make collections of insects or plants should be most particular in labeling them with the exact locality where obtained and date of capture or of blooming, as the case may be, and that those who do not regularly collect specimens should at least preserve specimens of those which are found troublesome, in order that they may be correctly determined, and also that they may be able to compare them with other and similar insects, so many species being easily confused with other forms, and that all observations of interest be invariably entered at the time in a note book, it not being safe to trust even to the best memory in such cases.

In regard to Botany I should say that this science is so closely connected with Entomology that every entomologist should be also a botanist, and every botanist might well be an entomologist also. The flowers of the North West are so beautiful that I should think that everyone must be charmed by them.

I had the pleasure of making a trip across the continent in 1890 and was simply delighted by the beauty of the wild flowers of the prairies. Though travelling rapidly, only stopping a day or two at a few of the principal points, I yet succeeded in making a very respectable collection of both the plants and butterflies of the region traversed, jumping off the train to gather plants at almost every stopping place along the line during the day time.

I regret that I am unable to meet with you at this the first annual meeting of the Society, but hope that you will have a very successful meeting, and if any of my suggestions are deemed worthy of adoption I shall be very glad.

With all good wishes I am,

faithfully yours,

HENRY H. LYMAN.

Henry Herbert Lyman, M. A.

The portrait prefixed to this volume is that of Mr. Henry Herbert Lyman, of Montreal, who has just retired from the Presidency of the Entomological Society of Ontario. He was born at Montreal on the 21st of December, 1854, and was educated at the West End Academy and the High School, winning at the latter the Davidson medal. From school he proceeded to the McGill University and obtained his degree of B. A., with the distinction of being the Logan Medalist in Geology and Natural Sciences, in 1876; in due course he took his M. A. degree in 1880.

The year following his graduation at McGill (1877) he entered the business of Lymans, Clare & Co., wholesale druggists, in Montreal, of which his father was a principal partner; two years later the firm became Lyman, Sons & Co. Mr. H. H. Lyman is now senior partner in the firm and is also president of the Lyman Bros. & Co. (limited) of Toronto. These business houses are known throughout the length and breadth of the Dominion, and have always been distinguished for their upright dealing, energy and enterprise.

At the same time that he began his business career he joined the volunteers in Montreal; starting as an Ensign in the 5th battalion, now the Royal Scots of Canada, he gradually rose to be Major in 1885, with which rank he retired in 1891.

Though deeply engrossed in business and with much of his leisure taken up by his military duties, he yet found time to devote to his instinctive love for Natural History. When less than eight years old he began to take an interest in insects and to observe their ways, and when only twelve he started to form a collection, the precursor of what is now one of the finest collections of Lepidoptera in Canada. His first printed observations on insects appeared in the 6th volume of the *Canadian Entomologist* (1874), and shewed that even in those early days he was engaged in the rearing of butterflies and moths, a work to which he has largely devoted himself ever since. He has now contributed to eighteen out of the thirty-one volumes thus far published, and has also furnished useful and interesting papers to several of the Annual Reports of the Society. The value of his scientific work and attainments has been widely recognized. Since 1891 he has been a member of the Editing Committee of the *Canadian Entomologist*: in 1895 he was elected Vice-President of the Entomological Society of Ontario and continued to hold that position until his election as President in 1897. He held this highest place in the Society for two years to the great satisfaction of the members, and retired at the recen annual meeting. He is also a Vice-President of the Natural History Society of Montreal, in whose winter lectures he takes an active part; an associate member of the Cambridge Entomological Club; a corresponding member of the New York Entomological Society and of the United States National Geographic Society; an honorary member of the North-West (Canada) Entomological Society; Fellow of the Royal Colonial Institute, Member of Council of the British Empire League, and Member of both the British and American Associations for the Advancement of Science. He has also been for the last thirteen years President of the Montreal Branch of the Entomological Society of Ontario, and has done more than any other man to keep alive the enthusiasm of the members and encourage all who show any interest in the subject to persevere in the study and experience for themselves the joys of the ardent naturalist. During all these years nearly all the monthly meetings have been held at his house, and the members have greatly enjoyed his generous hospitality.

Mr. Lyman is a notable example of what a busy man can do. Though engrossed all day long with the duties and cares of a very extensive business, which demands, more perhaps than any other, a close attention to innumerable details, he yet finds time, not only for the pleasures of an energetic collector of insects, but also for the performance of much careful and conscientious scientific work. His published papers are valuable contributions to science, being always characterized by thorough accuracy of statement and shewing the results of painstaking and long-continued research.

C. J. S. B.

BOOK NOTICES.

General Index to Miss Ormerod's Reports on Injurious Insects, 1877 to 1898.—By Robert Newstead, F.E.S. London : Simpkin, Marshall & Co. (Price 18 pence).

For twenty-one years Miss Ormerod has been issuing her valuable Reports of Observations on Injurious Insects, and in them has furnished a most useful mine of information regarding all the principal insects that that have been productive of injury in the British Isles during this long series of years. To render this mine readily available at any moment, a very satisfactory index has been prepared by Mr. Newstead. The greater part of it consists of a "General Index," in which reference is given to every insect treated of in the Reports under its scientific name, with reference also to habits, modes and subjects of attack, etc. This is followed by a "Plant Index," with reference to the insects attacking each ; a similar "Animal Index," and a third comprising other matters attacked, such as bones and leather, seeds, etc.

We are glad to learn from her preface to the volume that Miss Ormerod is about to begin a second series of Reports in a somewhat different form. C. J. S. B.

Flashlights on Nature.—By Grant Allen; illustrated by Frederick Enock. Toronto : William Briggs, 29 Richmond Street West. (Price 70 cents). pp. 312.

The late Mr. Grant Allen's versatility as a writer is well known, but whatever opinion may be formed regarding his novels and tales of fiction, there can be no question that few authors can be compared with him when he devoted himself to natural history subjects. His papers show that he must have been a most minute and painstaking student of the wonders of plant and animal life, while at the same time his literary skill enabled him to describe what he had seen and studied in a most charming manner and without any loss of scientific precision. He had also the able assistance of Mr. Enock, who is a well-known entomologist, and who evidently aided the author not only with his beautiful drawings but with his careful observations as well.

Most, if not all, of the papers in the volume before us have already appeared in the pages of a widely circulated magazine, but they are well worthy of reproduction in this more permanent and convenient form. They treat of insects, birds and plants, under such titles as the Cows that Ants Milk ; a Plant that Melts Ice ; a Beast of Prey (spider); a Woodland Tragedy (doings of a Butcher-bird) ; Marriage among the Clovers ; the first Paper-maker, etc. The closing paper, a Foreign Invasion of England, gives an admirable description of the life-history of the Hessian-fly. The illustrations, about a hundred and forty in number, are very beautiful, and in clearness and excellence leave nothing to be desired. Anyone with a love of nature cannot fail to be delighted with the book and to derive a knowledge of many things that were secrets to him before. C. J. S. B.

OBITUARY.

On the 16th of October there passed away at Peterborough one of the original members of the Entomological Society of Ontario. The Rev. Vincent Clementi, B.A., died at the age of eighty-seven years. He was a clerygman of the Church of England but had retired from active service some years ago in consequence of failing eye-sight and other infirmities. Born in England, the son of a famous musicial camposer, U. Clementi, Esq , and educated at the University of Cambridge, he came to Canada in 1855 and settled in Peterborough. In 1863 he was appointed rector of Lakefield, where he remained for eleven years ; he then became rector of Lindsay, and on his retirement returned to Peterborough to spend the rest of his days. He was an active member of the Masonic Society and rose to be Chaplain of the Grand Lodge of Ontario. In his younger days, and indeed throughout the whole of his life, he was devoted to natural history, horticulture and art, and was especially interested in entomology. He contributed occasionally to the early volumes of *The Canadian Entomologist*, and took a hearty interest in the welfare and success of the Society. His water colour drawings of insects were remarkable for their accuracy and beauty of execution. He was held in the highest respect and regard by all who knew him, and died a devout and upright man. C. J. S. B.

INDEX.

PAGE.

Aglossa cuprealis 100
Agrilus bilineatus 100
American Entomology, 100 years of..... 32
Anasa tristis 69, 102
Annual Address of the President..... 21
Annual Meeting, Entomological Society of Ontario 3
Annual Meeting North-West (Canada) Entomological Society 112
Anosia Archippus..... 78, 99, 101, 103
Aphidius Fletcheri..... 107
Aphids..... 59, 68, 95, 98, 101, 110
Aphis brassicæ 69
Argynnis chariclea 58
Ascalaphus 77
Ashmead, W. H., letter from 76
Asparagus beetles..... 58, 69, 71, 108
Aspidiotus ancylus 109
" Forbesii 109
" ostreæformis..... 27, 67, 109
" perniciosus..... 4

Belostoma Americanum..... 59
Benacus griseus 59
Beneficial insects..... 116
Bethune, C. J. S., articles by, 73, 100, 111, 118, 123
Birch trees, disease affecting 100
Blastophaga grossorum..... 28
" psenes 41
Blissus leucopterus 31
Blister beetles..... 108
ombyx mori 76
Book notices..... 124
Brown-tail moth..... 30
Bruchus pisorum..... 70, 94
Bud moth 66
Bumble-bees' nest 111
Burdock, larva eating seeds of..... 105
Byturus unicolor..... 68

Cabbage aphis 69
" bug..... 73
" butterfly 82, 94, 99
" worms..... 69, 108
Cadelle..... 71, 104
Calandra granaria 71
Calosoma calidum 116
Camnedes ochrogaster 94
Carterocephalus mandan..... 58
" palæmon 58
Cecidomyia destructor 31
" leguminicola..... 108
Cereals, insects attacking 107
Cerura borealis 104
" scolopendrina 104
Chermes abietis 60, 96
Cherry slug 95
Chilocorus bivulnerus 6
Chinch-bug 31
Chionaspis furfurus 68
Chionobas Macounii 59
Chloridea virescens 77
Chrysophanus epixanthe 103
" helloides, var. florus 58
" thoe 59
Cicindela vulgaris 116
Clementi, the late Rev. V 124
Clisiocampa Americana..... 51, 67, 95, 96, 100, 102
" disstria 51, 67, 95, 100, 102
Clover root borer 71
" seed midge 108
" weevil 95, 108

PAGE.

Clytanthus ruricola 100
Coccinella, 9-notata 107
Cockroach, the Australian..... 104
Codling-worm 66
Coenonympha inornata..... 58
Colias Christina 58
" Edwardsii..... 58
" Emilia 58
Colorado potato-beetle 68, 98, 115
" spruce saw-fly 63
Coniferous shade-trees, insects injurious to... 60
Cordyceps melolonthæ..... 76
Corydalis cornutus..... 95
Crioceris asparagi 58, 69, 72, 108
" 12-punctata 58, 70, 72, 108
Cuban insects 75
Cucumber beetle..... 69
Currant aphis 95
Cut-worms 94, 99, 115
Cyllene robiniæ 101

Danais Archippus 78, 99, 101, 103
Datana ministra 32, 96
Dearness, J., on the San Jose Scale..... 4
Dermestes lardarius 96
Diabrotica longicornis..... 57
" vittata 69
Diamond-back moth..... 94, 108
Dilophonota ello..... 77
Doryphora 10-lineata..... 68, 98
Drepanosiphum violæ..... 98, 110

Edena albifrons 104
Election of honorary members 45
" officers 2
Electric light as an attraction for moths 64
Emphytus Canadensis 98
Entomologists' Union proposed 21
Entomoscelis adonidis 115
Ephestia Kuhniella..... 30
Epitrix cucumeris 69
Erebia discoidalis 59
" epipsodea 58
Eriocampa cerasi..... 95
Erythroneura vitis..... 69
Eudiopis hyalinata 77
Euprepia caja, larva of..... 65
Euproctis chrysorrhea 30
Evans, J. D., article by..... 96
Exorista confinis..... 59

Fatal bite of an insect 73
Farm, injurious insects of the 70, 107
Feniseca Tarquinius 32
Fisher, G. E., on the San Jose Scale 14
Flea beetles..... 69, 94
Fleas 98
Fletcher, J., articles by 30, 106
" on the San Jose Scale 17
Fodder crops, insects injuring..... 108
Fruits, insects injuring 109
Fungus growth from insects 75
Fyles, T. W., articles by..... 52, 88, 102

Garden, injurious insects of the 68, 108
Geology of London 45
George H., article by 120
Gibson A., articles by..... 64, 97
Goniodtena pallida..... 58
Gopher bursarius 120
Grain and grass insects 94, 107
Granary beetle 71

PAGE.

Grape-vine flea-beetle 69
" leaf hopper 69
Grapta interrogationis 103
Greenhouse pests 98, 110
Gregson, P. B., article by 120
Grey hair-streak butterfly, larval habits of... 56
Gypsy moth 30

Hadena arctica 99
Halisidota Harrisii 24
" tessellata 24
Haltica chalybea 69
Harlequin cabbage bug 73
Harpalus caliginosus 116
Harpiphorus tarsatus 104
Harrington, W. H., article by 94
Heliothis armiger 59
Hemileuca maia, var. lucina 58
Hemisarcoptes coccisugus 6
Hemiteles mucronatus 104
Hessian fly 31, 107, 119
Hippodamia convergens 107
Honorary members, election of 45
Horse chestnut, caterpillars on 97
Hutt, W. N., article by 71
Hybernia tiliaria 102
Hydræcia cataphracta 99
" furcata 100
" nebris 99
" nitela 99
" stramentosa 100
Hydrocyanic acid gas, fumigating with....11, 14
Hylesinus trifolii 71
Hylotoma pectoralis 104

Icerya Purchasi 40
Injurious insects of 1899 ..... 66, 106
Insects of the year 94, 96, 97, 98, 100, 102, 106

James, C. C., on the San Jose Scale 16
Junonia cœnia 77

Kermes abietis 96
Kettle Point, geology of 46
Kissing-bug 29, 73, 96, 106

Lace-winged flies 107, 119
Lady-birds 68, 107
Larch saw-fly 61, 96
Larvæ, how to describe 23
Lecanium Fletcheri 96
Lepisesia flavo-fasciata 58
" ulalume 58
Lestophonus iceryæ 40
Limneria parva 108
Lochhead, W., articles by ... 41, 60, 66, 82
" on the San Jose Scale 12, 14
Locust-tree borers 101
" carpenter moth 102
Lophyrus abietis 96
Lycæna Anna 59
Lyda multisignata 58
" saw-fly 63
Lygæonematus Erichsonii 61, 96
Lyman, H. H., articles by 21, 121
" notice of 123

Macrobasis unicolor 108
Mediterranean flour-moth 30
Melanolestes picipes 29, 74
Meloe Americanus 108
Meromyza Americana 70
Metzneria lapella 105
Microgaster flaviventris 77
Moffat, J. A., articles by 75, 78, 98
Mytilaspis pomorum 67, 95
Myzus ribis 95

PAGE.

Nature-study lessons of cabbage butterflies... 82
Nectarophora destructor 59, 95, 97, 107
Nematus Erichsonii 61
" luteotergum 103
" ribesii 95
Noctua fennica 95
Novius cardinalis 40

Oeneria dispar 30
Officers, Election of 2
Oil-beetle injuring potatoes 108
Oil Wells 47
Onion Maggot 97
Orchard, injurious insects of 66, 109
Orgyia leucostigma 97
Orthosia helva 100
Oyster-shell bark-louse 67, 95

Pamphila Manitoba 103
" " var. Assiniboia 58
Pansy saw-fly 98
Paonias excæcatus 104
Papilio brevicauda 104
" marcellus 101
" turnus 101, 103, 104
Parry Sound district, geology of 47
Pea aphis 59, 95, 97, 107
" moth 70
" weevil 70, 94, 107
Peat beds 46
Pentilla mesilla 6
Periplaneta Australasiæ 104
Phlegethontius cingutatus 102
Phlyctænia ferrugalis 98, 110
Phorbia ceparum 97
Phyllotreta striolata 94
Phytonomus nigrirostris 95, 108
Pieris protodice 86
" rapæ 69, 82, 94 99
Pimpla inquisitor 104
Plant-lice 68, 107
Plume moth injuring clothes 117
Plum sphinx 32
Plutella cruciferarum 94, 108
Pocket gopher 120
Polistes crinitus 76
" lineatus 76
Polyphemus moth 31
Popular saw-fly 103
Praon cerasphis 107
Prinoxystus robiniæ 102

Ramsden, C. T., letter from 75
Raspberry fruit worm 68
Red spider 97
Reduvius raptatorius 74
Report of Auditors 44
" Council 42
" Delegate to Royal Society 52
" Geological Section 45
" Librarian and Curator 44
" Microscopical Section 47
" Montreal Branch 48
" Quebec Branch 51
" Toronto Branch 49
" Treasurer 44
Rhodites radicum 68
Root and vegetable insects 68, 94, 108
Root maggots 108
Roses, caterpillars on 98, 110

San Jose Scale, conference on 3, 57, 106
" native home of 55
" Ontario Commission on 26
Saw-toothed grain beetle 71
Schizoneura lanigera 68
Scolytus rugulosus 110

PAGE.
Scurfy bark-louse 68
Semasia nigricana 70
Silvanus Surinamensis 71
Silver-top 94, 108
Sinea diadema 74
" multispinosa 74
Siphonophora avenæ 94
Slugs 68
Smut, remedy for 116
Sphærostilbe coccophila 6
Sphinx chersis 106
" drupiferarum 32
" kalmiæ 104
" luscitiosa 104
Spiders 88
Spirifer increbescens 46
" mucronatus 46
Spruce gall louse 60
" saw-fly 63, 96
Squash bug 69, 102
Strachia histrionica 73
Strontium caves 46
Sulphur springs 45
Syrphus flies 107, 119
Syrphus ribesii 107

Tarantula 75, 94
Telea polyphemus 31
Tenebroides mauritanicus 71, 104
Tent caterpillars ... 51, 67, 95, 96, 97, 100, 102, 109
Terias nicippe 77
Tetranychus telarius 97
Thecla iroides 58
" melinus 56
" niphon 58
" strigosa 58, 110
Thrips 69, 94
Tmetocera ocellana 66
Torrubia 77
Trogus exesorius 101
" fulvipes 101
Turnip beetle, the red 115
Tussock moth 97

Uranotes melinus, larval habits of 56
Use of Entomology 118

Vanessa antiopa 96
" Californica 58
Vegetables, insects affecting 68, 94, 108
Violets, aphis on 98, 110

Webster, F. W., articles by 32, 55, 56
" on the San Jose Scale 8, 55
Wheat, insects injuring 107
Wheat-stem maggot 70
White-cedar lecanium 96
Wing-structure of a butterfly 78
Wire-worms 115
Woolly aphis 68

Yellow-necked apple-tree caterpillar 32, 96

ANNUAL REPORT

OF THE

BEE-KEEPERS' ASSOCIATION

OF THE

PROVINCE OF ONTARIO

1899.

(*PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE.*)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS.
1900.

ANNUAL REPORT

OF THE

ONTARIO BEE-KEEPERS' ASSOCIATION

1899.

To the Honorable the Minister of Agriculture

DEAR SIR,—I have the honor to submit herewith the twentieth Annual Report of the Ontario Bee-Keepers' Association, in which will be found the papers read at the Annual Meeting held in the City of Toronto, on the 5th, 6th and 7th of December, 1899, and a full report of the discussions thereon. The report of the Inspector of Apiaries and also the audited statement of the finances of the Association are also submitted.

I am

Yours truly,

W. COUSE,

Secretary.

OFFICERS FOR 1900.

President, - - - - - - - - C. W. Post, Trenton.

1st Vice-President, - - - - - - - John Newton, Thamesford.

2nd Vice-President, - - - - - - - J. D. Evans, Islington.

Secretary, - - - - - - - - Wm. Couse, Streetsville.

Treasurer. - - - - - - - - Martin Emigh, Holbrook.

Directors:

District No. 1 ..... W. J. Brown, Chard.

District No. 2 ..... J. K. Darling, Almonte.

District No. 3 ..... M. B. Holmes, Athens.

District No. 4 ..... C. W. Post, Trenton.

District No. 5 ..... J. W. Sparling, Bowmanville.

District No. 6 ..... J. D. Evans, Islington.

District No. 7 ..... A. Pickett, Nassagaweya.

District No. 8 ..... James Armstrong, Cheapside.

District No. 9 ..... John Newton, Thamesford.

District No. 10 ..... F. A. Gemmell, Stratford.

District No. 11 ..... W. A. Chrysler, Chatham.

District No. 12 ..... Samuel Wood, Nottawa.

Ontario Agricultural College..... Dr. James Mills, Guelph.

Auditors, - - - - - - - - { Will J. Craig, Brantford.
Edw. E. Dickinson, North Glanford.

Inspector of Apiaries, - - - - - - Wm. McEvoy, Woodburn.

Assistant Inspector of Apiaries, - - - F. A. Gemmell, Stratford.

Representative to Industrial Exhibition, Toronto, - A. Pickett, Nassagaweya.

Representative to Western Fair, London, - - John Newton, Thamesford.

Representative to Canada Central Exhibition, Ottawa, J. K. Darling, Almonte.

Next place of meeting, Niagara Falls.

LIST OF MEMBERS FOR 1900.

Name.	Address.	Name.	Address.
Armstrong, James	Cheapside.	Kendrick. J	New Dublin.
Armstrong, John	Streetsville.	Munro, J. A.	Munro Mills.
Brown, W. J.	Chard.	Munro, J. G.	Clenroy.
Brenton, F.	Corbyville.	McEvoy, Wm.	Woodburn.
Boomer, A.	Linwood.	McEwen, Robert	Renfrew, Box 69.
Bailow, Joel	Delta.	Miller, F. J.	London, 223 Dundas St.
Byer, J. L.	Markham.	McLaughlin, D. H.	Vankleek Hill.
Beaupree, M. C.	Simcoe.	McKnight, R.	Owen Sound.
Bailey, John	Bracebridge, Box 41.	McLaughlin, Alex.	Cumberland.
Blais, Adolphus	Glensandfield.	Madden, Michael	Sarsfield.
Couse, William	Streetsville.	Nolan, Dennis	Newton Robinson.
Chrysler, W. A.	Chatham.	Newton, John	Thamesford.
Comire, A. O., M.D.	St. Francois du Lac, Yam-	Pickett, A.	Nassagaweya.
Cummer, D. W.	Florence. [aska Co., Que.	Pierie, John	Drumquinn.
Craig, Will J.	Brantford.	Post, C. W.	Trenton.
Cox, William	Hamilton, 12 Bruce street.	Potter, D. M.	Elora.
Colson, I. T.	Purbrook.	Ross, D. D.	Martinton.
Darling, S. F.	Perth Road.	Reaman, Josiah	Carville.
Dickson, Alex.	Lancaster.	Robinson, Geo. E.	Hatchley Station.
Darling, J. K.	Almonte.	Sloan, W. H.	Milford.
Davidson, B.	Uxbridge.	Smith, R. H	St. Thomas.
Davidson, C. W.	Mount Albert.	Sparling, J. W.	Bowmanville.
Dickinson, Edw. E.	North Glanford.	Smith, H. C.	Athens.
Davison, John F.	Unionville.	Sibbald, H. G.	Cooksville.
Emigh, Martin	Holbrook.	Saunders, Geo. E.	Hornby.
Evans, J. D.	Islington.	Smart, N.	Collingwood.
Farmer, Thos. W.	Ancaster.	Shaver, J. H.	Cainsville.
French, Augustine	North Glanford.	Stewart, Alex.	Canfield.
Farran, C. C.	Farran's Point.	Switzer, J. F.	Streetsville.
Gemmell. F. A.	Stratford.	Schilz, Mathias	Renton.
Gale, H. E.	Ormstown, Que.	Shantz, Aaron	Haysville.
Goodfellow, Alex.	Macville.	Shultz, H. G.	Clontarf.
Gemmell, John	Lanark.	Sarrizine, Maxime	Rockland.
Gray, A. W.	Burridge.	Sherrif, G. G.	Clarence.
Hand, E. G.	Fenelon Falls.	Taylor, Alex.	Paris.
Holmes, M. B.	Athens.	Thomas, Joshua	Deacon.
Hall, J. B.	Woodstock.	Wisner, Isaac G.	South Cayuga.
Heise, D. W.	Bethesda.	Wood, Samuel	Nottawa.
Jeater, W. H.	Kineardine.	Wood, George	Erasmus.
Johnston, Geo. E.	Bracebridge.	Walton, W. S.	Ballantrae.
Kennedy, J. A.	Glenroy.		

FINANCIAL STATEMENT

Of the Ontario Bee-keepers' Association made to the Department of Agriculture for the Province of Ontario for the year ending Dec. 5th, 1899 :

Receipts.		Expenditure.	
Cash on hand from last year	$ 46 60	Grants to other societies, fairs, etc.	$205 00
Members' fees	114 00	Expenses of meetings	3 00
Legislative grant	500 00	Officers' salaries	75 00
Affiliated societies' fees	40 00	Directors' fees and expenses	139 08
For copy of stenographic report	15 00	Postage and stationery	25 89
		Printing and advertising	9 79
		Periodicals for members	74 10
		Cost of reporting	30 00
		Executive, *re* Paris exhibition	32 90
		Auditors' fees	4 00
			$598 76
		Balance on hand	116 84
Total	$715 60	Total	$715 60

W. J. Brown, President.
Martin Emigh, Treasurer.

Examined and found correct this 5th day of December, 1899.

H. G. Sibbald,
G. E. Saunders, } Auditors.

ONTARIO BEE-KEEPERS' ASSOCIATION.

ANNUAL MEETING.

The twentieth annual meeting of the Ontario Bee-keepers' Association was held in the Albion Hotel, Toronto, on Tuesday, Wednesday and Thursday, December 5th, 6th and 7th, 1899. The President, W. J. Brown, of Chard, occupied the chair.

The minutes of the last annual meeting were read by the Secretary, Mr. William Couse, and, on motion of Mr. W. A. Orysler, seconded by Mr. J. H. Shaver, they were confirmed.

THE PRESIDENT'S ADDRESS,

By Mr. J. W. Brown, Chard.

It was with some misgivings that I assumed the honored position of presiding over your deliberations, but, when called upon to do so, I took up the task with a determination to do my duty without fear or favor from any source, and never to relinquish the one object I ought to have in view, namely, your interests at every turn. My success is largely due to the two worthy gentlemen whom you elected to co-operate with me. Those two gentlemen have done all in their power to assist me to carry out the work for the past year. Each Director responded at every call, and, with very few exceptions, every man in the ranks fell into line and offered every assistance in his power. And, knowing this, it is with perfect confidence I stand before you to-day, believing that you will again assist to make this annual meeting one of the most pleasant and profitable in the history of the Association. Let our watchword be, "Peace and harmony in our ranks," for a house divided against itself will surely fall.

The past season has been a very unfavorable one in nearly all portions of the Province; scores of bee-keepers have been compelled to feed their bees in order that they might have sufficient stores to winter on.

There are many questions which will be laid before you for your consideration. Among others, I might mention the question of the Association purchasing from the Goold, Shapley & Muir Co., of Brantford, the *Canadian Bee Journal*, and assuming the management of that journal. With this question I am not prepared to deal at any great length. However, I would like to hear your opinion as to the probable cost of such a purchase, the probable cost of running the *Journal*, and as to whether we could have all this done for less money than it costs us at present, or would we be in any better position by purchasing the *Journal* than we are now in?

Another matter is the Paris Exposition in 1900. It will be remembered that at our last annual meeting a motion was passed to the effect that if the Executive Committee deemed it advisable to make an exhibit at Paris, that the matter be arranged. It was deemed advisable by your Executive Committee to make an exhibit at Paris, but not at Earlscourt; therefore, your Committee spared no pains to arrange with the Canadian Commissioners of the Paris Exhibition to have a creditable exhibit of honey at Paris next year, the cost of said exhibit to be borne by the Department of Agriculture at Ottawa. This question may require some further explanation, which I have no doubt will be given by the Commissioner himself in the course of his address before you. There are many features in connection with this matter which are of much interest to you: the fact of this year's crop not being in all cases of an A 1 quality; there is the question of your being permitted to send over a supply of next year's honey to replace what will be sent of this year's crop; as well as the question of your being allowed to recommend the person to whom the care and setting up of the exhibit will be assigned. I would not recommend the sending of an exhibit to a foreign country that would not do justice to our industry and our country, and unaccompanied by a fit and proper person to look after it.

So far as I can learn, our Inspector of Apiaries has been overcoming foul brood wherever he met that pest in a bee-yard. His report will be laid before you in due time, as will also all other official reports.

In compliance with another motion passed at our last annual meeting your committee saw fit to recommend the names of Messrs. J. K. Darling, M. B. Holmes, J. E. Frith and Fred. Gemmell as fit and proper persons to lecture at Farmers' Institute meetings, and forwarded the names to the superintendent of Farmers' Institutes.

Before closing I take this opportunity of thanking you all for your able and generous assistance to me in carrying out the work of the Association during the past year, and hope that during this meeting every officer and member will continue to assist me to preserve the best of order, and not allow anything to mar the harmony now existing among us all. (Applause).

Mr. DARLING: In discussing the President's address I do not know that I will say very much about it. With regard to the taking over of the *Canadian Bee Journal*, I do not know whether now would be the proper time to air my opinion on that or not, but I might say that I do not know that it would be just wise, and perhaps it would be as well to give a reason: a great many of us have been dissatisfied in the past with what we received for our money, and also in the way we were treated at times, but I am convinced by what I have seen during the last two or three months that there is a very great prospect of a change for the better, and if we can be as well served, as there is a possibility of being served, and at the same time refrain from taking up something we do not know very much about, I think we would be wise to let people who understand such things run that part of the business and pay them a fair remuneration for what we receive. With reference to the crops of the season I am sorry there has been a good deal of truth in what Mr. Brown has said. Some odd individuals have secured what some of us would call in any season a large crop—perhaps they would not call it a large crop this year owing to the locality in which they live being better than the general run, but take it all over the country, the crop has been from small down to nothing; and we are not alone. This may tend to the raising of prices. In fact the price of honey has been on the downward tendency for a good many years past. What is in the future for bee keepers is more than I can tell, but I do not think it is altogether an unmixed evil.

Mr. GEMMELL: With regard to taking over the *Journal*, I remember some five or six years ago there was quite a talk of doing the same thing, and there was a good deal of opposition to it. It was thought by some that it would be better if the *Journal* was managed independently, while other thought if the Association took the matter up our interests would be better served. I do not know what the opinion of the Association is now; but as far as I am concerned I am quite willing to help in any way that may be decided upon by this meeting, whether it be taken over or left as it is. There are a number of things to be considered which would take quite a little time to state now.

Mr. MCKNIGHT: I had not thought of the subject at all, but I see by the *Journal* it has been canvassed, and a variety of opinions expressed upon it. As Mr. Gemmell says, this is not the first time in the history of the Association when a movement of this kind has been on foot. When it was about to pass from the hands of The D. A. Jones Company into that of the present proprietors, there was a pretty strong movement made in the same direction, and there were a number of the members of the Association strongly in favor of taking over the *Journal*, and in fact, I think two or three special committee meetings were held in connection with the matter. Some of the members thought it would not be a wise course. I was among the number, and I am of that opinion still. I do not entertain that opinion because of any fear I have of lack of sufficient material to conduct the *Journal* properly; the difficulty I see in the way is a very important one, and that is, available funds. You cannot conduct the paper for nothing, and I do not think this Association is sufficiently large to warrant us in undertaking the conducting of a special journal in connection with its own proceedings.

Mr. W. J. CRAIG, Editor: While I am not officially appointed to say anything in this connection, you have been made aware through the *Journal* that our company would willingly hand over the management of that publication to the Association if so desired, and it is for this purpose, to find out the minds of the members of the Association, that our President has brought it up. At the same time we want, perhaps, more than anything else, your co-operation in connection with the management of the *Journal*. We cannot get along without that, and I thank the members of the Association who have extended to me their sympathy and,—indeed more than their sympathy—their help in

this connection. There may have been things that we have not liked, and there are some things that our firm of publishers did not like. However, these things all belong to the past, and we would like the hatchet to be buried at this time, and all to pull together once for all.

Mr. BROWN : With regard to what Mr. Craig has just said ; the proprietors are not over-anxious to dispose of the *Journal*, but would dispose of it at a fair remuneration. On the other hand, with the active co-operation of the Association, we will have a better journal than we have had in the past, and I think that under the present management it will be all right in the future. Of course, there were things which appeared in it which were not very pleasant for some of the members ; and I question if the Association was the owner of the *Journal* to-day, whether there might not appear things in it that would not be very pleasant to some of the members. It is impossible to please everyone.

Mr. CRAIG : When I took the position I occupy with the *Journal*, it was on the distinct understanding that they would not interfere with the reading matter of the *Journal*.

Mr. HEISE : While I think it would perhaps be in the interest of the Association to conduct a journal, my opinion would be identical with that of Mr. McKnight. Under the present circumstances I do not see how it could possibly be done with the funds available.

The President asked Mr. Couse to express an opinion upon the matter of taking over the *Journal* :

Mr. COUSE : I suppose the first matter we would need to consider would be the financial matter. I feel that we cannot afford to take it over ; I feel, though, that we can afford, each of us, to do a little better than we have done before, which will result in the *Journal* being more useful to us all, and in that way we can, perhaps, assist Mr. Craig. That is about as brief as I can put the matter.

Mr. PICKETT : Those who look after the business of the Association know that our means are limited, and we should not go into anything that has even the appearance of extravagance. I am not sure but that the success we have met with on other occasions, would warrant us asking for that amount under existing circumstances. I think the Government would require to know that we really need this, and that it would be a vast improvement upon what we have had, and also that it was the wish of the Province at large that such a *Journal* be maintained. In approaching the Minister of Agriculture for an increase some years ago I found, as perhaps many another has done, that the Government are very careful, and, while our demands were not extreme, we did not succeed in getting all we asked for. At the present we are not suffering with any very great amount of indebtedness, and if we incur the liability that a journal would necessitate, I fear they would think we were asking rather much at their hands, and I see no hope of any other source of gaining that point ; and while I need not lay any claim to supporting the present *Journal*, I am in hearty sympathy with those who are willing to try. I think the only method open at present is to leave it in the hands of the present owners.

IN MEMORIAM.

Moved by M. B. HOLMES, seconded by F. A. GEMMELL, " That whereas the Ontario Bee-keepers' Association has, since its last annual meeting, lost an honored and respected officer by the sad death of Herbert N. Hughes, of Barrie, and whereas during the years he had served as a Director in the Board of Management of this Association, he had, by the deep interest ever manifested in matters pertaining to our industry, shown that the interests of bee-keepers were being well studied and advanced at every opportunity, while at the same time his straightforward and gentlemanly bearing, coupled with his genial and friendly manner, won for him a very warm place in the hearts and affections of all who knew him ; be it therefore resolved that we, the Ontario Bee-keepers' Association, take this, our first opportunity, of giving a united expression of the grief that possesses us in the separation from our friend and co-worker, and that we extend to the family of our late colleague our heart-felt sympathy and condolence in their great grief, and we trust that the shadow and gloom pervading the home in consequence of this bereavement

may be dispelled by the presence of the Great Comfortor, the Wonderful Counsellor, who brings consolation, comfort and cheer even in the darkest hour to all who commit their ways unto Him. And be it further resolved that this resolution be recorded in the minutes and an engrossed copy, signed by the President and Secretary, be sent to the family of the late Herbert N. Hughes." Carried.

SPRING MANAGEMENT IN THE APIARY.

By D. W. Heise, Bethesda.

On receiving notice from our worthy President some time ago that the Executive Committee had seen fit to place my name on the program for a paper on spring management, with the request that I at once endorse the action of the said committee. I replied saying, that while I thought very little of the subject assigned me, yet I would endeavor to have something to say upon it at this convention. My reason for saying that I thought very little of the subject was not because I considered it one of slight importance, but from the fact that it has within the last few years received considerable attention at conventions and through the different journals, and more particularly from the fact that the subject was so ably and thoroughly handled only a year ago at the city of Guelph by our esteemed friend, Mr. Sibbald. So while it would seem to be pretty well exhausted, yet perhaps after all there are always those in our ranks who could largely improve on their spring management, and with the thought before me that "keeping everlastingly at anything will eventually bring success," I take encouragement, and will endeavor to briefly outline what I would consider "ideal" spring management in my locality when bees are wintered on the summer stands.

The first step towards proper and successful spring management should be taken not later than the fifteenth of September of the fall previous, (that is when there is no fall flow,) by contracting the brood chamber with a division board to a size accommodating the strength of the colony, which may be from four to seven combs. The remaining combs in the space so contracted, whatever the number may be, should contain not alone what we might consider was sufficient stores, but a supply that we are absolutely certain will be an abundance to carry the colony safely, not only through the winter but right up to the time of fruit bloom. By preparing the stocks in this way the bee-keeper will have no occasion to open up the hives for an examination until the weather is sufficiently warm that all danger of chilling the brood or breaking the cluster will be reduced to a minimum. The first examination of bees in the spring should not be made until some calm day when the thermometer will register seventy degrees or more in the shade, and after the bees have been permitted for some days to gather both water and natural pollen. When the above conditions are present the hives should be opened, and the strength and condition of the colony ascertained. All hives should now be contracted to a capacity best suited to the size of the cluster, that is, in case such had not been attended to the fall previous. As the colonies of average strength will be found at this date, with from two to four frames of brood in different stages of development, these frames should be raised up sufficiently high so the honey along the top bars and in the corners can be uncapped. This will cause the bees to move it, and they will certainly store it in the cells that surround the brood, where it will be of most advantage. In the case of no honey being along the top bars of the frames which contain the brood, frames of honey (first having been uncapped) should be placed one on each outside of the brood next proper. Uncapping in this way serves a twofold purpose: first, by providing the liquid honey for larvæ food, and of easy access; and, secondly, by clearing the coast for the queen to widen out her circle. All garbage and dead bees should be removed from the hive floors at this time—a very simple matter indeed if the bee-keeper has been so wise as to use only loose floors; unfortunately some of us are still hampered with permanent floors. All the foregoing having been attended to, the operation will be completed by replacing the clean quilt (if such is used) with a gum cloth, putting on top of this three or more thickness of paper, return the top packing, contract the entrance, and close the hive. While it takes some little time to outline the above manipulation, yet in actual practise

only a very few minutes are required for the whole operation. Any queenless colonies that are found at this time should be forced on not more than three frames, and united at the very first favorable opportunity and given a queen. In eight or ten days, if the weather be propitious, and the bees have been able to gather from the fields moderately, more uncapping should be done, the brood chamber enlarged, if found necessary; frames containing honey should be placed outside of the division board "a la Sibbald," which is a positive preventive of starvation, and an excellent stimulant for the extension of the brood nest. Do anything and everything that will not disorganize or endanger the colony, but that which will compel them to convert honey into brood; because it is bees we must get at this time, if we expect to have our supers rapidly filled when the main harvest arrives. From this time up to fruit bloom, frames should be added to the brood chamber, and frames of honey inserted, as often as the condition of the colony and the amount gathered from outside may demand, always selecting a fit and proper day for the operation. At the opening of fruit bloom is the time when all full winged queens should be clipped. Having recently noticed considerable discussion in the bee journals regarding this operation, I am persuaded to mention the method I practice, and for which I am indebted to Mr. McEvoy: As the queen is heading for the top bar when the frame is held on an angle, I catch her by the wings with the finger and thumb of the right hand, and then pass her over to the finger and thumb of the left hand, securing her by the two legs on her left side. When held in this position she cannot squirm, and the operator's right hand is at liberty to remove (with a pair of scissors) any portion of the wings desired. When completed, simply hold her close to the comb, relax the pressure suddenly, and she is at liberty without her body ever having been touched.

Now, to come back to the time of fruit bloom: all strong colonies, and those of average strength, will be in a condition to have their full quota of brood frames returned to the brood chamber. Any colonies that are above the average strength and appear crowded, should be provided with supers filled (or partly so) with brood frames, allowing the queen to occupy them if she chooses to do so. By this method we get the dark fruit bloom and dandelion honey swapped off for bees, which at the opening of the white flow should be given to the weak colonies, a certain number of which, I think, most bee-keepers have on their hands at this season. Another very important detail requiring attention at this time is scraping all propolis from the frames and out of the rabbets, also removing brace and bur combs. Making everything clean and smooth at this time greatly facilitates the manipulation of frames in the busy season. Neither should we forget that the less propolis we leave in the brood-chamber the less we are likely to have in the supers. Having the colonies up to our ideal of strength when fruit bloom is past, our every concern should be to guard against famine striking the bees during the gap between fruit bloom and clover. This tided over, spring management ceases and summer management commences, and I will let the other fellow tell about it. I have said nothing about supplying the bees with water, neither have I said anything about having everything in readiness for the season's work. As the journals are keeping these matters vividly before bee-keepers' eyes, I conclude that a word to the wise is sufficient. Now, I do not wish to be understood that I practise in detail what I have been preaching; neither do I wish to be understood that the above is the sole and only system of spring management that can possibly lead up to success; but it is what I would practise were I not sometimes prevented from doing so through pressure from other business duties.

Mr. F. Gemmell: Mr. Heise has done the thing so well that I do not know that I shall hammer him. In regard to weak colonies, I do not care to bother with them when they are very weak; I would sooner have the colonies as nearly as possible the one strength. If I have three or four colonies that are not very strong, I would prefer doubling them up and giving them all about the same amount of combs. As far as queenless bees are concerned, I have found that, as a rule, they do not pay for the bother with them. As to uncapping the honey, I think what Mr. Heise has suggested is all right.

Mr. McEvoy: I have followed that plan off and on for seventeen or eighteen years, and I have made it pay after I got right into it and understood pretty near how to do it; but I have had it go the other way at times. I have always made it pay between fruit bloom and clover. There is a gap in most localities, and it pays to uncap some. I have

uncapped sometimes too much, and have made a mistake ; but it is well to uncap two or three in an evening in the bare time, in order to supply them with unsealed stores and to feed the larvæ. I get the honey used up rapidly, and I increase in bees. A little later on I uncap more. Some bees will not uncap the old sealed honey fast enough, when they are caught suddenly, to keep pace with the amount of larvæ on hand ; then it pays to look after uncapping or bruising. This year I went through the colonies three times between fruit bloom and clover, and with 95 colonies I had it so arranged that almost every frame was filled with brood clear up to the top bars and from end to end to the outside wall. Did it pay ? Yes ; I never did anything in my life that paid so well. I would not advise every one to do it ; some might go on a morning of a spring day when there was not much to get and uncap too much. You must use judgment.

Mr. J. B. Hall : Mr. Heise's paper is excellent ; the only part I object to seriously is that which says he does not practise it himself. I differ with him a little in the crowding of the bees in the fall. Bees are like communities : sometimes in the community there are no deaths, and other times deaths are large. If you contract them in the fall, they still want contracting in the spring. My practice with bees several miles from home is to leave them just as they are in the fall, and give them sufficient to last until fruit bloom. Do not unpack your hives ; don't clean them out ; they will clean themselves out. The contraction, if any, should be done in the spring and not in the fall. I think Mr. McEvoy will differ from me.

Mr. McEvoy : Certainly, on that point.

Mr. Hall : My experience is this : the weak colonies winter better than the very strong colonies. The middle colonies are the ones that winter best ; the very strong colony is dead, generally speaking, in the spring, or very weak, and that is the time they want contracting ; so do your contracting in the spring instead of the fall. The bees will contract themselves and get into a small compass. We never clip our queens like Mr. Heise said. We clip our queens, of course ; we cannot run after swarms. We hunt our queen and, after finding her, we simply set her outside at the hive, and we get down on one knee at the business with a very sharp knife (shows), and we simply get the queen by the wings and use the knife, and take away the part we lay hold of.

Mr. Heise : Mr. Hall says a colony of bees will contract themselves in the fall. We know that : why then not contract the space to accommodate the size of the cluster ?

Mr. Hall : In the spring, when you open up the hive at the time of fruit blossom, you will have eight cards of brood, with perhaps four or five pounds of honey in them. Then, as far as taking weak bees and uniting them with others, you are wasting your time. If they cannot pull through themselves you are better without them.

Mr. Heise : I would not attempt to equalize the bees by taking from the strong to build up the weak. But would it not be better to take the weak ones and put them together ?

Mr. Hall : My experience of over twenty years is that if you take nine weak colonies and put them into three, you will have three weak colonies ; if you shut them down and do not meddle with them at all, there will be sure to be some of those that will come up and be good colonies, and the others that are no good will die out ; and if you put them together one of the poorest queens might be the one saved.

Mr. Heise : I did not advocate uniting weak colonies in my paper ; I advocated, where there were queenless colonies, to unite them.

Mr. Hall : That is worse still ; these queenless bees were born the fall before.

Mr. Heise : Mr. Hall, referring to about 10th to 20th April, how many young bees would you find hatched in that hive ?

Mr. Hall : If it is a good stock of bees there will be more bees than we put in in the fall.

Mr. Heise : Your colony differs from mine.

Mr. Hall : We do not open them except they are hungry. We do not open a stock of bees in our yards until the fruit blossoms. We let weak ones die if they choose.

Mr. Dickson : Between apple blossoms and clover is a blank ; sometimes their is a week and sometimes possibly a week and a half—I am down in the extreme

east end of Ontario. My practice is not to sell the buckwheat, and we save this buckwheat to feed the larvæ; and when these bees arrive you will have workers, and you will have a strong swarm which will work—and the honey will come, too.

Mr. McEvoy: I wonder how many here would be able to catch the queen by the wing like Mr. Hall does. I think we would be likely to cut a little bit more than the wing.

Mr. Hall: Not with a knife.

Mr. McEvoy: Take an ordinary farmer, and I think he would take half the bee. I admit that Mr. Hall's remark is true, speaking generally, that medium bees winter best, the weak ones fizzle out and the strong ones will go to pieces, that is, without contracting in the fall of the year; but take good strong stocks and go back to the crowding system in the fall of the year, and put them on combs solid sealed and they won't go to pieces, because I have stopped the queen from breeding.

Mr. Hall: This is outside business.

Mr. McEvoy: In or out the strong ones go to pieces, and I am going to fix it so that I can stop that. Coming to the weak colony, I will agree with you in the spring of the year. I will put two or three of them together in the fall of the year, and I will bring out a colony in the spring on the crowding system and not keep them spread or give them the whole comb or too much territory. During ten days in February in last winter we here in Ontario had a sort of Klondike weather. If the bees are spread out the steam condenses in all the combs outside the cluster and some bees starve to death, with honey in the outside, and if they had been crowded in the centre, when they wanted honey all they had to do was to lean forward. It is a sure system, and it is better than Mr. Hall's.

Mr. F. Gemmell: Mr. McEvoy is all right; he crowds them on to four or five combs, and there is no place for the queen to lay until they have wintered, and then they commence to boom right along.

Mr. Walton: Why do strong colonies succumb?

Mr. McEvoy: You can break up almost any colony. Take good strong colonies, spread out when going into wintering outdoors and empty, and there is all the chance in the world to lay in the centre, and the bees have to care for the young. The bees become restless and are worn out to no purpose, and you have spring dwindling and fizzling out. You can check that; just give them the sealed combs, and rest your queen.

Mr Walton: When do they commence to breed in the other case?

Mr. McEvoy: Later on; as they consume a little more and more they are getting further out to the spring, and you can get more fly-days; you have rested your bees and you have saved them. I am speaking from practice.

Mr. McKnight: Does not your system prevent bees from clustering?

Mr. McEvoy: No.

Mr. McKnight: I understood you to say that all the bees had to do was to lean forward.

Mr. Gemmell: They are clustered on the honey.

Mr. McKnight: They are practically spread over the comb.

Mr. McEvoy: They are crowded up solid, and some of them are behind the division board. Speaking of the division board, I would like to improve on the division board. I like to have a bee space at the ends and bottom, and if I do happen to crowd a few outside they will get in there. I do not want division boards to fit so close that I have to rip them up.

Mr. Gemmell: I have contracted in the fall and they wintered first rate, because there was no space for the queen, and in the spring they boomed right along.

Mr. Darling: Reference has been made to the strong colonies breeding early. I know what some of my experience has been. The seasons vary greatly in the eastern part of Ontario. I have seen me put out good strong colonies in the latter part of April or first of May with scarcely any bees in the hives; I have seen me put out strong colonies in the last week of March and first of April with young bees crawling all over the combs. I found the young bees crawling over the combs by the 10th April.

Mr. Hall: Mr. Heise's paper spoke of wintering them outside, and with a very large population there will be more deaths than with a small population; for instance,

the city of Toronto has more deaths than the locality where Mr. Darling lives, simply because there are more to die; the dead bees clog the entrance and smother the balance. I might relate that one year we got no honey six or seven miles from home, and the lady of the house had a baby and the eldest girl was down with typhoid fever, and they did not want a stranger to feed the bees; and I had to go out and feed them in the latter part of October or first of November. We had thirteen nuclei. I fed my bees first, and after I got through I had some syrup left. I did not want it to be kept over to the spring, and I went to these nuclei and made two colonies of them. Allow me to tell you, contrary to my expectation, those were the two best colonies in the apiary of about eighty colonies. I would not advise anyone to do this, but sometimes things turn out different from what our expectations or calculations are. I would not run the risk of buying sugar for them, but I had it made.

Mr. DARLING: I am firmly of opinion that our bees sometimes breed in the winter and we sometimes do not know. I had one colony in particular that had a spot of brood as large as my hand on one comb and I think there were three combs altogether, and I expected that colony would be no good. It was the best colony I had when I put it out next spring. I do not think it is the breeding altogether; I think there is something else which we have not got at the bottom of.

Mr. MCEVOY: For twenty years or more I have had more or less that was not crowded on five combs, sometimes ten and fifteen. I guess this year I have about ten crowded on five combs, but I noticed in the spring of the year ten or fifteen that were not crowded, and, although they had the weight and were heavy with honey, they would not average up with the crowded ones.

Mr. DICKSON: Some would advise doubling up and trying to keep your colonies, but I say it is all very well for an amateur to try that, but since we have carried on the business exclusively we have found it does not pay to double up, neither does it pay to doctor a poor colony in the spring; let them go.

Mr. HOLMES: My experience in the matter of the small colonies tallies exactly with what Mr. Hall told us. On more than one occasion it has happened to me that the small colonies have come up and done excellent work, as good as those of a great deal more pretentious dimensions.

Mr. ARMSTRONG: My experience has been about the same as Mr. Hall's with his nuclei. When I put two or three colonies together and put them into proper shape, as a general thing they were my best colonies in the spring; that is, if they did not start breeding before the spring. I have had them to come out and cluster outside in February. I was sure that colony would go up and be no good next spring, but if they were closed up tight with full sheets of sealed honey, no room for the queen to do anything until they got some consumed, those colonies came out all right.

Mr. HALL: I have great faith in Mr. McEvoy, and I think it is four or five years ago since we hived our bees on contracted hives of five combs instead of eight. I fed them up as much as they would take, and therefore, I presume, it was solid combs they had, and in the spring they were in a nice condition. But allow me to tell you that I had to go into them and give them room for breeding purposes, and I did not get so much honey from them as in other cases. It may be my location or stupidity.

Mr. ARMSTRONG: Do you not think the reason you did not get good returns from the strong colonies was that there was a time before the main flow came that they would run down in stores?

Mr. HALL: I will tell you decidedly on that. They had too much stores. They could not consume it to raise brood, and as I was lazy I did not take out this division board until fruit bloom. But they wintered well.

Mr. GEMMELL: If you have weak colonies in the fall and double them up they will come out all right, but give them room afterwards.

Mr. HALL: But suppose they are weak in the spring?

Mr. MCEVOY: You are going on the idea that there are going to be a lot of them weak.

Mr. HALL: Do you not have weak colonies in the spring?

Mr. MCEVOY: Certainly, some.

Mr. HALL: You lose all of your nice queens. Let them be, and those that are

worth anything will come up and give some honey, and those that are worth nothing will die.

Mr. HEISE: Would you leave them on as many as 8, 10 or 12 frames?

Mr. HALL: Whatever it is I do not meddle with them. I look under the bottom to see if they are strong. I do not touch the top at all.

Mr. WALTON: If the weak ones winter that way without being contracted, why do not the strong ones do so?

Mr. HALL: I give you the reason: With a small entrance and large population there would be more dead, and they would drop on the bottom board, and they would suffocate.

Mr. WALTON: It is a somewhat interesting question to this convention. This spring management of bees has drawn out quite a discussion. With all the experienced bee-keepers here, I may be away behind the times, but I tell you my bees are not. I contract neither spring nor fall.

Mr. HALL: Neither do I.

Mr. WALTON: We ought to get to some settled point on this question. With reference to the weak colonies in the fall with Mr. Hall I would allow them to stay so. If they have stores enough do not meddle with them. I practice out-door wintering, but last year I wintered 25 in the cellar—they were queens I had not sold. They were rather weak, but they surpassed all the ideas and opinions of the writers in the journals. I could give the temperature and a good many things along that line, but I do not think it is necessary. I would leave the weak ones quietly alone if they were any ways protected for the winter. Also as to clipping queens, I am not in favor of clipping with scissors. I am afraid there is a liability to clip the queen in two.

Mr. DARLING: I lay my finger right on the back of the thorax and the wings come up that way, and I clip what I catch, one, two or three, and let her go.

Mr. MCEVOY: Mr. Walton, how much do you take off?

Mr. WALTON: I take off both wings, one on each side. I think I like to have the queen evenly balanced.

Mr. GEMMELL: It is astonishing how easily they will fly if they have wings the same on both sides.

Mr. WALTON: I do not get down on one knee; when the queen is coming right down some comb I catch her thus with the two wings. (Shows). We are always in haste in doing this thing, and I think it is the nicest way to clip wings. I suppose I learned it from Mr. Doolittle. I think Mr. Heise's paper is very good.

Mr. NEWTON: I am sure this paper has been pretty well discussed, and a good paper it has been. I think any paper that will bring out the discussion that this has led to this afternoon, is worthy of the thanks of this Association. There are some things I agree with, but most of you know I am of Mr. Hall's school, and of course, I fall in with a great many of his ways. With reference to the clipping of the queen, Mr. Heise's plan seems to me to be a very awkward one. I think if I were to try Mr. Heise's plan I would be very apt to kill the queen the first go off. In working with my hive, I sit down on the hive top; I place my comb between my knees, and catch her as she runs up the comb, and in somewhat the same way as friend Hall does, I strike a knife across the finger, and I take about one-eighth or a quarter of an inch off one wing, which is sufficient to prevent her flying away, and this does not disfigure the queen. I do not believe in contracting in the fall. I give them a good letting alone in the spring until we have time to work with them in fruit bloom, and sometimes, if it is an extra good spring and they have been shut up, I have in mind two cases where there have been four or five cards of new combs built in. I generally find that medium stocks winter best.

Mr. WALTON: Do those who change from one hand to the other ever break the legs?

Mr. GEMMELL: Never.

Mr. MCEVOY: Never; if you get the two legs it is all right.

Mr. NEWTON: But we touch only the part we take away.

Mr. PICKETT: The matter which I have risen to speak of is this uniting of weak colonies in the spring. I think one of the first things we require to take into considera-

tion is the temperature at which our hives should be when breeding; and another is, how are we to get that temperature at the earliest possible moment so as to secure the required amount of bees to bring in the honey at a proper season? I presume these are two, at least, of the many things that are required. The more bees there are together and the more closely they are confined the sooner will that temperature be arrived at; the more room you give them the longer it is going to be, and the later in the season before they are going to start to breed, and the sooner they commence the sooner you may have something to replenish those old bees that have been laying back; because if they were light colonies in the fall, the chances are that there are a great many more, and therefore, even if they are left to themselves I do not wonder if you have a number of them that are no use in the spring and die, because it is so long before they can replenish their number that they outlive themselves. My impression is that if you unite them in the fall, and they are still light in the spring, which sometimes they are, I would say unite them then; you had better have one good one than half a dozen otherwise.

Mr. HALL: But you are not making them good by so doing.

Mr. PICKETT: The method we take to get them good is by increasing the number of bees at the earliest possible moment, and, if they have not got the heat, you know as well as I do all the honey you could pile into your bee-hive would not amount to much. You cannot get the bees if they have not sufficient heat.

Mr. MCEVOY: What do you do in the last of May with weak colonies?

Mr. HALL: The last of May with weak colonies, if we have any—sometimes we have and sometimes we have not: last year I think we had five—but, whether we have few or many, we simply go to a hive that will hold the brood, and we pick out what we think is the best queen, we take all the brooding bees away from the others and place into the hive with the best queen. Then we have a hive full of brood just fit for coming out, and just in right condition to commence on the clover bloom, and will give you lots of honey. We have a slate on every hive, and we mark what we have done, and we do not give that queen credit for anything that is good. We start with A, and we go down and go up. If you come into my yard and see the mark A 1, XX, you will know that the queen is worth her weight in gold.

Mr. WALTON: Before the end of May our weak colonies are nearly all dead. Then, it looks to me, when we have our colonies contracted to four or five or six combs of sealed honey, we do not give them an opportunity to breed until late in the season, and then we have to manipulate them. If the bees breed earlier in the season, and are left to themselves and have plenty of stores, I believe we are not troubled much with spring dwindling.

Mr. SIBBALD: There is another point in favor of contraction that has not been spoken of yet, and that is, getting the brood filled into the combs right up to the top bar. One reason why I favor contraction is because in the spring when we have only four or five they commence, and being good and strong they fill it right up to the very corner, and when we slide that back and put in two or three more they are ready to fill them up to the corners, and when we fill our hive we have it properly filled. It is hard to get them to fill like that, unless we practise contraction.

Mr. HALL: Mr. Sibbald does not keep a record on his hives. There are more than half the queens if left to themselves will fill those combs full from corner to corner. You saw the comb I had in Hamilton. That came out of the middle of a stock of bees.

Mr. SIBBALD: How many more had you like that?

Mr. HALL: I will take you to one half of my hives and have them like that. If you had a record slate on your hives you would raise your stock from that sort of queens. If you keep your record on your hives, and just save those queens, you will see they fill up from end to end, from top to bottom, and you will find they are all like that, unless you live near a neighbor who raises drones.

Mr. ARMSTRONG: Do I understand Mr. Sibbald opened the brood nest and put two or three combs into the centre?

Mr. SIBBALD: I did not say that. We slide back the division board, and, if the first comb has honey and no brood in it at all, it will go back with the division board, and then the added combs we put in next to the brood, and if there is brood on the outside combs we would leave them in too.

SPRAYING OF FRUIT.

The PRESIDENT called upon Mr. JOHN NEWTON, of Thamesford, to open a discussion upon the "Spraying of Fruit," who said: I think this is one of the most important matters we could have before us, because we have this law and it is neglected right in our midst from spring to spring, and bee-keepers are losing bees by the thousands every spring. I feel we ought to have some more force with what we have in order that we may put a stop to it more easily than we do. Last spring I happened to be going through our village and saw a man spraying some trees, and naturally I went over to see what he was doing. He was spraying trees with Paris green. I said, "You should not do that." "Yes, I should; the spraying company men told us to do it." I said, "We have a law which says you must not do it." He said, "I do not know of any such law, and until I am informed of such a law I will keep on spraying." I said, "I will give you the law to-morrow morning, and in the meantime you do not want to do any more of it or there will be a way to stop it" I felt, to my own interest, I ought to be independent and try to stop it. I think there are bee-keepers in all localities who are affected just the same. There are men who go around with these spray pumps who do not seem to care for anybody except themselves, and the little money they get out of them in selling the spray pumps. I think we should have the law put up in places where it can be seen. I sent down to Mr. Hall, at Woodstock, and got three or four copies of the law, and sent one down to the house, and his wife looked at it, and she said, "I know he won't do it any more." I know he took warning from the slip I sent. I think if we would do this there would be thousands of bees saved.

Mr. PICKETT: I have not had any experience in the last five years in this matter. Before that I had some neighbors that indulged in spraying their plum trees, and for some considerable time I could not understand what it meant. Our bees appeared as if someone had given them liquor, and they wandered about in a listless way, eventually dying. After a time we learned it was caused from trying to gather from these sprayed trees. As the law is very explicit, I presume there is no better way under present circumstances than the way suggested by Mr. Newton, that is, letting people know what is and what is not.

Mr. WALTON: I believe there is not a bee-keeper present but is very much interested in this subject of spraying, and who has not been materially injured through it. I am glad this has been brought up. We have a law against it, but there is very little done towards educating the people to spray their trees at a certain time. Even the agents selling the spray pumps will tell you that the proper time is to spray just when the bloom is coming on, and they will argue black and white that that is the proper time.

I think it would be a good thing if the editor of the *Canadian Bee Journal* would publish this law of spraying in the spring number of the journal. Could not, too, this Association by some means have pamphlets distributed to scientific bee-keepers, who should have them distributed in their neighborhoods? It is a serious thing to have our bees die off at that time of the year; and sprayers through different parts of the country are very careless. They think they have a right to spray, and they do not know anything about the law, and therefore, they spray at any time which suits them.

MR. DICKSON: In my section, especially around my neighborhood, I make it a point every spring to get hold of these pamphlets, and I put them up in the post office. In regard to publishing the law in the *Journal* I hardly think it will do much good, because it will come pretty much only to bee-keepers and members of our Association. We could do nothing better than to distribute these notices.

Mr. SHAVER: Just a few years ago our Government sprayers went right across the road from a bee farm, and the farmer said that every morning he could find fifty to sixty bees lying around the hive.

Mr. MCEVOY: I think our friend Shaver is not quite correct in his statement. He says the "Government sprayers." Mr. Orr is the Government sprayer, and there is no man who has gone farther out of his way to warn people against wrong spraying. Mr. Orr got an immense quantity of pamphlets printed, and on the back of these is a warning not to spray while trees are in bloom, and gives instructions when to spray, and how to spray. These will be given free, and if you get a lot of these and distribute them to all the fruit growers in the locality they would see the proper time to spray.

Mr. Craig : It is only a couple of weeks ago that I got a copy of the Act referred to, and I have it reserved for publication in the spring *Journal*. Would it not be well to have a notice of the Act put up in local post offices, or in such places where the public would have an opportunity of seeing it and knowing what the law is in regard to this matter.

The President : A great many of those who spray in fruit bloom do so through ignorance, and an endeavor should be made to inform them of the law. I think sometimes pamphlets are distributed in the wrong way, and when the people get them they throw them to one side and never read them. When a man consciously breaks the law the bee-keepers are wrong in letting him slip through their fingers. It was through the voice of the bee-keepers that this law was established, and such persons who willingly and knowingly break the law should be punished.

Mr. Newton : I think it is a good idea to post the pamphlets in the post offices through the country. I remember the case of an old lady in our village two years ago, who sprayed while the trees were in bloom. I spoke to her about it, and she said she did not care, she was going to save her apples. I spoke to her this spring before the time came on, because I thought she might do it again. She said she did not care whether it killed my bees or not, she was going to save her apples. I said : " We have always been friends, and I do not wish to be anything else ; but if you will do it, I will have to do something to stop it, because it kills my bees in such large numbers." She did not like it a little bit. There should be something done to such people as those.

Mr. Walton : The law is all right, but I think we ought to let them know the time to spray. If they do not know the time when to spray, and you try to prohibit them from spraying, they will begin to kick terribly. I should think pamphlets ought to be distributed through the country, and it would be a good thing for the bee-keepers or someone else to see that it was put in the daily papers, or put into the county papers all through the country. It will be a grand thing to teach people when to spray, because then they would not kick against the law, because it is not the time to spray when the tree is in bloom, as I understand it.

Mr. Newton : Speaking with reference to that lady, she said : " The sprayers told me I should do it when the trees are in bloom, and I am going to do it."

Mr. Hall : I relate an instance that came under my personal notice. Two years ago a certain lawyer, a Queen's counsel, was spraying his trees in fruit bloom, and when remonstrated with and told it was against the law, said, " Nonsense, it is not." I pulled out copies of the pamphlet which has been referred to and showed him the law, and he was surprised to find that it was the law.

Mr. A. Stewart, Canfield : A neighbor of mine was spraying against the law, and when told about it he said he did not care for law or anybody else. I said if he kept on spraying I would bring the law to bear on him. He did not care, he was going to spray. He was an ignorant man. These parties who are stubborn should be dealt with according to the law.

Mr. Darling : The great difficulty we have to deal with is the fact they do not know. The agents of spraying pumps tell them to spray in bloom. I have thought that we ought to take it up in the proper time of the year, and have all the local papers publish an article giving the time to spray for the different pests, and above all things to emphasize the fact that under no circumstances should trees be sprayed when in bloom, because it injures the fruit.

QUESTION BOX.

The question box was opened by Mr John Newton, of Thamesford.

Q. What success, if any, are drone and queen traps at out-apairies ?

Mr Newton : I can only say that I have no experience personally on the matter, but I have met with some parties who use drone traps, and who were away from home during the day and came home at night and attended to their bees that had swarmed during the day, and I have been told they worked with very much success.

Mr. DICKSON: I will give you a little experience myself. If you carry business on a large scale, and if seven or eight were to go off at once your drone traps would not amount to anything, and with a large apiary the queen-catcher would be troublesome, but the queen-catcher is a good thing other ways.

Mr. POST: I have had no experience with them.

Mr. MCKNIGHT: I have no experience, and the fact that very few have had experience seems to me to imply their employment does not commend itself.

Mr. EMIGH: I have had no experience at all. I have no out-apiaries, but if the drone trap would get two or three swarms together that would be just what I would want. I want those big swarms.

Mr. DARLING: Mr. Emigh, did you ever get your colonies too strong?

Mr. EMIGH: No.

Mr. DARLING: I have had them so strong that they would not work. I have had no success until I destroyed the queen and gave them a sheet of brood. Where they are so strong they are so very apt to ball the queen.

Mr. EMIGH: Possibly strange bees coming back might ball the queen.

Mr. MCEVOY: I have not had experience along that line at all. I think Mr. McKnight put the whole thing in a nut-shell, that if it had been of much practical value the bee-keepers would have been on to it.

Mr. NEWTON: I find in my own yard I like to have a drone trap once in awhile, and I think having one or two in the yard comes in very handy.

Q. What are the objects of contracting by division board?

Mr. NEWTON: The writer to this does not say whether it is spring or fall, or when. We have had a discussion this afternoon on the fall part of it and partly in the spring. I was surmising that he meant probably during the swarming time in connection with probably comb honey. He also follows with the following question: What are the advantages in clipping queens? So I would take it for granted that he was speaking of contracting in connection with the comb honey. I think it is a great advantage in the way I work, working for comb honey. I think that the swarms are the ones we get the nice comb honey from, and are the ones we get the most from, and by contracting them with division boards and filling up with dummies, we get them into such a space that we get our combs mostly all workers. By crowding them on five cards we get the biggest percentage of worker comb, and also crowd the bees into the sections and get nicer filled sections.

Mr. POST: I think it depends a great deal on the time the bees swarm whether you get the most or best comb honey. If you can keep bees from swarming together I think you can get far better honey and more of it. If they swarm two weeks before the main honey flow they will be the poorest swarms you have in the yard, and if it is a little too late it is just about the same.

Mr. HALL: That is something I would give fifty dollars to know. He might get on without swarming. His location is different from mine. I have tried his method, and it is good for many things: it ventilates the bees, it retards swarming, and they work better; but as far as preventing swarming with me I do not know that it prevents ten per cent. of them. I think it must be the location. As far as the contraction is concerned I want my bees to swarm right in the commencement of the honey season—not one day before. My hive is a large enough hive, and they fill that with brood, and not much honey. If they swarm from the first to the twentieth of June I want them on five starters for comb honey. We get a very small percentage of drone comb, especially if the queen is old.

Mr. MCKNIGHT: I asked the question, and I do not think anybody could have any particular trouble in discovering what the meaning of the question is. I have heard a great deal in my lifetime in thirty years' experience about divisions boards and contraction. I want to know if the use of division boards has any other purpose than that of conserving heat and confining bees.

Mr. HALL: I know of no other use than those two.

Mr. MCKNIGHT: I never use a division board, because I never was yet persuaded that a division board was necessary for either of these purposes unless the division board is perfectly tight.

Mr. HALL: We don't want them that way any more.

Mr. McKNIGHT: Unless it is of that character it cannot conserve heat to any great purpose. I asked the other question that grows out of this. What is the object in clipping queens in a home apiary or any other yard where the bee-master himself is present? The only object in the world that I see of clipping queens is to control swarms, and to prevent the queen from flying away. I do not think it prevents the queen from being lost. I never clipped a queen, and therefore, I cannot say anything upon the various methods of performing that surgical operation.

Mr. HALL: I do not want the division board for confining heat. I want it during the swarming season if I am taking comb honey. I want it to contract the hive. Sometimes I want to raise five, ten, fifteen or twenty queens from one stock of bees that have swarmed, and to do that I pile a lot of brood combs into the same hives, and a few days after I cut out the cells and put one into each comb, and I put a division board in to make a hive. If you did not put that in, they would then build comb on each side, which you do not want them to do, because they generally build drone comb.

Mr: McKNIGHT: Would not the removal of the unnecessary frames answer the same purpose to a great extent.

Mr. HALL: No. When you get busy a man cannot attend to these little things; and when you go back to it she has built three or four small combs, outside of the division board.

Mr. McKNIGHT: I admit its use to confine bees, but I never could admit its use to confine heat.

Mr. HALL: With regard to Mr. McKnight's second question as to the advantages of clipping queens, I venture to say if I did not clip my queens I would have ten times the work. Another reason is, to know the age of the queen. I am working in my workshop where I can see the whole yard; I know may queens are all clipped, and when I see a swarm come out I am not in a hurry to drop my tools and run. Sometimes we have five or six out at one time.

Mr. NEWTON: I know it is a great saving of labor to have the queens clipped.

Mr. WALTON: It has a great many advantages in my experience. You are not in a hurry when the swarm issues. You may be engaged in something else. I use some swarm catchers, and when I pick up the queen I put her in a cage and slip her on the swarm-catcher.

Mr. McEVOY: Mr. Hall has given the advantages of the division board, and I think Mr. McKnight will have to acknowledge its advantages. Now it is just as necessary to crowd these bees for outdoor wintering into smaller space. By crowding them up they cover the comb with the honey, and if the honey is warm and if we get Klondike weather it will not affect that honey.

Mr. DICKSON: I use the division board pretty freely. I never heard people say that they use it to increase the honey crop.

Mr. HALL: Mr. Newton and I use it to increase the worker comb.

Mr. DICKSON: I used it to increase the extracted honey. Take a young swarm: I put in eight frames with two division boards. I look upon it that the honey goes up above; when the feeding time comes, to prepare for winter, which is the great secret of spring management, I pick out these two division boards.

Mr. McEVOY: How many frames do you use in your hive?

Mr. DICKSON: Ten—We take out these division boards and replace them with combs of honey. In our locality there is a good flow of buckwheat honey, and these buckwheat combs are put in the place of these division boards, and I look upon it that we get more extracted honey, and more of the clover honey in the supers.

Mr. HALL: That would lead on to another thing. I have an out apiary nine miles out where we get a buckwheat flow, and we simply hive them as we would for comb honey, on five starters, and as soon as the white honey ceases we take out the dummies and put in sheets of foundation. We just simply divide two, and stick in three sheets of foundation for the bees to fill up with buckwheat honey for wintering, and they do it.

Mr. McEVOY: This gentleman has struck a very important point; the more honey that is stored below the less you get above, and if he contracted ten to eight he really went into business.

Mr. SHAVER: Then, an eight-frame hive is better than a ten.

Mr. DICKSON : I find the eight deficient for wintering.

Mr. DARLING : With regard to making bees carry honey upstairs by placing division boards below, I was bothered with one of those queens that seemed determined to go away, and when I say the queen I think we should blame the whole stock of bees. I wanted to get some comb honey. I piled up supers, two, three, or four high, and they were not satisfied unless they would go. Finally I cut the queen's head off. They came out after that and fortunately, or unfortunately, they got a young swarm with them while in the air, and got mixed up with the bees that had the young queen, and I concluded if they would not do as I wanted them to do, I would see if I could make them do otherwise. I took one of those Jones' hives and filled up part of it with those dummies. I went to the hive the swarm had come out of, and I took off the three supers and carried it and put it on top of those three frames, and put the swarm in. After that time I had all the honey they gathered. It was a virgin queen, and she did not get to laying for some ten days. When I took the sections off there were three cards of solid brood from top to bottom, put in as pretty as ever I saw. There were not two pounds of honey in the hive.

Q. Foul brood is now better understood by the bee-keepers than when the Foul Brood Act was passed. Could it not be better cured and sooner exterminated by appoining a number of sub-inspectors, whose duty it would be to inspect every colony in their districts and attend to the curing of any disease found by visiting the apiary as many times as necessary.

Mr. NEWTON : I might say I have thought of this question a good many times. It seems a lot of work for our inspector to pass from one end of this country to the other and do ample justice to every bee-keeper in our country. We have talked it over in our Oxford convention. If there was one appointed in connection with our local conventions, I think the disease could be sooner done away with than it is. I know how it is with our friend McEvoy. He will visit some place in the west, and then he is away to the east. Sometimes he may not get back for weeks, and probably months. Well, we do not know whether that man is doing his duty or not. If there was a man in that district to see to it, I think the thing could be cured quicker.

Mr. MCKNIGHT : There is one point in connection with this which, perhaps, has been overlooked. In order to carry out the suggestion that has been made, the law affecting foul brood will have to be changed. There is nothing in the law now which would clothe a local officer with the necessary power to carry on the work.

Mr. MCEVOY : Sometimes I run up into a yard where a man has not done his duty, and is not likely to do his duty, and needs to be looked close to. If he has a mind before I go into the yard he can challenge me to produce the authority, and I have to show that I am legally and lawfully appointed, with the President's signature, or he can show me the gate and tell me to get. I have no power to go on any man's premises without the legal document. This fall I went to carry out the law in one place, and I was afraid I would be driven out, but fortunately I was not challenged. I was going to enforce the law very forcibly.

Q. Is it advisable to re-queen with virgin or young mated queens in order to diminish or prevent swarming, and with a view also of obtaining a large amount of surplus ?

Mr. NEWTON : I used to think at one time that if we could prevent swarming and keep our stocks from swarming we would always get the largest crop of honey. The last few years I have changed my opinion. I think that if the colonies seem determined to swarm, the sooner they do so the better, and then, when the swarming fever is over, I think they are in a position to give us honey. I have seen no advantage in what I have tried of re-queening or running virgin queens in to prevent that, because sometimes the hive is at the point of swarming when we undertake to do that, and putting the young queen in when the swarming fever is there won't prevent swarming.

Mr. SIBBALD : I do not think putting a young queen in will prevent the swarming, if they are determined to swarm. That has been my experience.

Mr. HOLMES : It seems to me that has changed the view of the question somewhat. Are we not supposed to give them the young queen before they get that determination to swarm ?

Mr. NEWTON : The question does not say that.

Mr. HOLMES : In reference to the desirability of having the swarm issue, in my experience I prefer to have the bees all in one hive. I would expect to get better results

from that than to have them swarm. I do not want my bees to swarm if I can avoid it. Of course, as to the effects of placing the young queen in in the spring to prevent swarming, I am not prepared to speak definitely, but I have experimented on that sufficient to give evidence, and the little experience I have had would be to answer the question in the affirmative, that it would hinder swarming.

Mr. DARLING: We try lots of things we do not know how to manage, and perhaps that was the way when I tried this re-queening business some years ago. I found sometimes they would not accept the young queen, and they would just simply wait until some of their own hatched, and I had a first swarm with a virgin queen. They would start a lot of queen cells, and would refuse to accept the queen I put in, and they came out determined to swarm. There was a good deal in the bee journals pro and con with regard to swarming some years ago, and I thought, like a good many others, that if I could keep the bees at home I could get a good deal more honey. It never worked. That which has given the most satisfaction is to let the bees swarm.

Mr. HEISE: I think the reason for Mr. Darling's non-success was the fact that he left introducing the young queen until the colony had made preparations for swarming. If he had introduced the queen early enough no doubt it would have had the desired effect.

Mr. HOLMES: I would like to emphasize the statement I have made, that at the beginning of the honey season I would rather have one hive full of bees than to have two hives half full.

Mr. HALL: They are stubborn things, and with me if they want to swarm, I have, of late years, never tried to retard them.

Mr. DARLING: Mr. Heise suggested that I was too late. I think that was one difficulty, but just there I have had a little experience which would not probably make it so sure if it was done earlier. I have had colonies swarm, and in the course of three or four weeks the prime swarm swarmed again. That, of course, was the old queen. I have had colonies swarm, the young queen hatched out, become fertilized, and went on and went to work, and in six weeks swarm.

Mr. HALL: Last year we had four cases of that kind.

Mr. GEMMELL: Those are exceptions to the general rule.

Q: Is it wise or unwise to allow the bees to clean out the combs after last extracting?

Mr. NEWTON: I would say yes. Of course, we all have different ways of doing this. We would not like to put away sticky combs into our storeroom after we have got through in the fall. Some put them on the hives again. I think from the tone of this that the questioner means not to change combs for fear of foul brood or something to that effect. But if he is afraid of that, put them on the hive again and have them cleaned, and if he is not afraid of that, why put them out doors and let the bees at them.

Mr. MCEVOY: How far from the apairy would you put them?

Mr. NEWTON: I would not care if they were just about thirty or forty feet.

Mr. GEMMELL: What time?

Mr. NEWTON: I always put mine out in the morning before the bees fly; space them and have them ready, and in a couple of hours they will be perfectly clean.

Mr. MCEVOY: I draw the line at any certain time, because if you lived in town or village just after the honey-flow you would start the bees in such a cross way that they would clean out all the cats or elephants.

Mr. DICKSON: I have experience in that. We always do it in the evening when the bees are all quiet—never in the morning. We carry them away from the yard possibly eighty feet. They kick up the first morning for possibly an hour or two, and after that those fellows know that road just like cattle to a well—no trouble in the world.

The PRESIDENT: That has about been my experience. I remove them probably eighty feet, or thereabouts, and after they get the road there they will go there, and I do not notice that they do much damage to cats or elephants.

Mr. NEWTON: As soon as they get started out, as our friend here says, they will make it a business transaction just as much as if they were going off to the field to work.

Mr. Wood : Do you not find if they get it used up before night they are apt to get to robbing ?

Mr. Newton : That has never been my case.

Mr. Wood : To take it away through the day I find it starts them to robbing, or if they finish it up before night.

Mr. Newton : Do not understand me that I take mine away during the day.

Mr. Wood : But if they have cleaned them up it is all the same as taking them away.

Mr. Newton : If they get through with the empty combs, and they leave them, then you can take them away safely at night.

Q.: What is the best way to do with combs having small quantities of honey in them in the fall ?

Mr. Hall : I have not any time when I go down. It is about nine miles down ; and I go down and pick off every super and pile it up where it is going to stay for the winter ; and we keep them shut down till we get them all off, and then we simply put a chip or nail into the top piece and let the bees at it, and I tell you there is music, but we never had any trouble ; we never had any robbing. I have to finish the job up. Sometimes there may be 150 pounds of honey, but they move it home pretty quick.

Mr. Sibbald : Two years ago I did not get my combs all cleaned up, as had always been my habit, and I put them on next spring, and I found the bees rushed up readily into them and filled them right up, and I intend to practice that again. I would like to have the combs left with a little sweet on them, and the bees will go into them much more quickly in the spring, and if they are put on between the apple bloom and the clover this will be very useful in stimulating the bees, and it will save quite a bit of trouble, and I think it is an advantage to have them in that shape.

Mr. Post : That is all right if honey is coming in, but if there is no honey coming in, I will guarantee they will not go up and put honey in.

Mr. Shaver : I have followed that practice two or three years, and my combs keep better and I never found them granulating.

Mr. McEvoy : Suppose it does, the sieve catches the granulated.

Mr. Newton : If you have some buckwheat honey—

Mr: Shaver : I never have any buckwheat honey.

Mr. Gemmell : I want my combs clean, because very often if left in that way it granulates.

Mr. Newton : We very often get inferior honey in the fall.

Mr. Walton : When the extractor is used to the combs is it any detriment to the combs to leave a small amount of liquid honey in them ?

Mr. Gemmell : I do not want to put my extracting combs down in the brood chamber ; they will clean it out if it is granulated down there if they get a little water.

Mr. McEvoy : If they are stored in a proper place they will do no harm.

Mr. Shaver : After basswood flow with us we hardly ever have much honey of any account. They put in maybe three or four combs a little patch ; I extract them and never dry them, and they are not badly mussed, and there is always a little honey, and I find the bees go to them next spring.

Canadian Honey.

A discussion arose as to whether it would be possible and advisable to withdraw what had been done towards forwarding a honey exhibit to the Paris Exposition, because it was felt that the bee-keepers of the Province would hardly be able to do justice to themselves, as the honey crop this year had been so poor. It was decided that it would not be advisable to withdraw, now that the matter had been proceeded with so far, but the bee-keepers would endeavor to obtain consent to replace the honey, which had been sent, with samples of next year's crop, which it was believed would be much better in quality.

AFFILIATED SOCIETIES' REPORT.

There have been eight county Societies in affiliation during the present year, as follows: Russell, Halton and Peel, Haldimand, Norfolk, Oxford, York, Glengarry, and Brant. Each Society received a grant of twenty dollars, and these grants have been expended as directed by the by-laws governing such expenditure.

The reports of the increase of bees and the production are not as full and satisfactory as usual, two Societies (York and Norfolk) not reporting.

	Colonies, Spring.	Colonies, Fall.	Honey, Comb. lbs.	Honey, Ext. lbs.
Russell Co. Association	184	267	2,450	6,310
Halton & Peel "	1011	937	...	7,500
Haldimand "	414	414	20	6,270
Oxford "	621	699	4,234	15,465
Glengary "	540	685	....	7,400
Brant "	338	400	975	10,150
	3,108	3,402	7,679	53,095

Average extracted honey per colony, 17 1-12 lbs.

Average comb honey per colony, 2½ lbs.

Average increase in colonies, about 9½ per cent.

These averages show a very poor yield of honey, and we take it for granted that if all the societies had reported the average would have been less.

W. Couse, Secretary.

DIRECTORS' REPORT.

The Directors' report for the present year differs from former years in that one cannot report a prosperous season generally over the Province, and also that we have to report the death of one of our number since our last meeting. We are sure the friends of Mr. Hughes will have your deepest sympathy.

The general business of the Association has been fairly well looked after, but owing to the severe and protracted illness of the Secretary, some matters have not been as well attended to as we could wish, the chief difficulty being want of experience.

The sum of $200.00 was set apart for affiliated Societies, of which $160.00 was paid to eight societies, that being the number affiliated.

The usual grants of $25.00, $10.00 and $10.00 were made to the Toronto Industrial Exhibition Association, the Western Fair Association of London, and the Canada Central Fair at Ottawa. These grants were expended in accordance with the law.

The *Canadian Bee Journal* has been sent to each member of the Association. They have also received a copy of the annual report.

We are pleased to be able to report our finances in good condition, there being a balance of about $116.84 in the hands of the Treasurer.

All of which is respectfully submitted.

INSPECTOR OF APIARIES REPORT.

During 1899 I visited bee yards in the counties of Haldimand, Norfolk, Middlesex, Oxford, Brant, Wentworth, Lincoln, Wellington, Halton, Peel, York, Ontario, and Simcoe. I inspected one hundred and twenty-six apiaries, and found foul brood in forty-seven of them.

In places where I had never been before is where I found nine-tenths of the foul broody apiaries the past season, and over three-fourths of the owners of these diseased apiaries did not know that their colonies had foul brood when I first visited them. I

took the greatest of pains to explain to the bee-keepers how to manage the business so as to have every colony a good strong one, and in fine condition, when they were cured of the disease.

In looking back over the nine years that I have inspected the apiaries of the Province of Ontario, I noticed that I had found foul brood very widely spread through thirty counties. I succeeded in getting thousands of foul broody colonies cured and the disease driven out by wholesale, and peaceful settlements made *in every case* where diseased stocks were sold through mistakes of the parties selling, not knowing of their colonies being diseased at the time of sale.

Nine years ago very few of those that kept bees then were able to tell the disease from other kinds of dead brood, and not over half a dozen men in Ontario could cure an apiary of foul brood, and end the season with every colony in first-class order. The instructions that I gave while on my rounds through the Province, and the driving out of the disease by wholesale, will make Ontario one of the safest places in the world to keep bees in.

Mr. F. A. Gemmill, of Stratford, is the man that deserves the credit for all the work that I have done, and the Government of our country that has paid for it. In 1890 Mr. Gemmill took hold and worked hard until he got the Foul Brood Act passed, which has proved to be a great benefit to hundreds of bee-keepers.

I am greatly pleased with the way the bee-keepers took hold in the past season and cured these apiaries of foul brood. Where I found a few worthless colonies almost dead from the disease late in the fall (and near fine, sound apiaries) I burned them. The total number that I burned in the Province was twenty colonies, after the owners and I had reasoned out things nicely together.

For the courteous and very generous way that I have been treated by the bee-keepers of every locality that I went into, I return my most heartfelt thanks.

My time, car fare and livery hire, $734.30.

WM. MCEVOY.

WOODBURN, Dec. 4th, 1899.

Mr. HOLMES : In order to place the subject before the meeting I would only say that I think I would be voicing the desires of the meeting in saying we have all confidence in our Inspector of Apiaries ; he does his work well, without fear or favor, and I would move the adoption and endorsation of Mr. McEvoy's report.

Mr. NEWTON : I have great pleasure in seconding Mr. Holmes' motion. I believe our Inspector has worked faithfully, not only in this season but in past seasons.

After several members had expressed their appreciation of the work Mr. McEvoy had done, the motion was carried unanimously.

BEE-KEEPERS' ASSOCIATIONS : THEIR PAST, PRESENT AND FUTURE.

BY W. Z. HUTCHISON, FLINT, MICH.

The time was when a man who owned some bees would walk a mile or two to see an article "on bees" in some paper. The time was when a bee-keeper would come home from a convention fairly loaded down with the new things he had learned. If the wives of the bee-keepers who now attend conventions should ask their husbands upon their return what new things they had learned, I think some of them would have to scratch their heads before replying. The time was when the principal feature of any association was the dissemination of methods for managing bees. This is no longer true. The social pleasures are now the paramount feature of a convention. Perhaps no one has admitted this ; but look deep into your heart and see what answer you find to the question, "Why did you come?" Editors of bee-journals and the supply dealers may go to a convention to further the interests of their business, and it is entirely proper that they should, but the producer of honey comes mostly, principally, and all the time "to see the boys, and have a good time." I will admit that many things in regard to the management of bees for profit are still learned at conventions ; and these gatherings would still be as valuable for this purpose now as in days of yore were it not for the great number of most excellen$_t$

and low-priced journals devoted to the business. No sooner does a bee-keeper make some discovery than he reports it to his favorite journal; the other journals copy it; and by the time that a convention meets there is nothing new to talk about—it has all been told.

But the social feature of a convention is not to be sneered at. The friction of mind against mind, this rubbing up against our fellows, brightens us, sharpens our wits, gives us broader views, and makes us better bee-keepers and better men. Then, there is the pleasure of it. This life is not simply a life of dollars and cents. At least it *ought* not to be. The man who has worked at home all summer owes himself and his wife an annual outing with kindred spirits.

From a business point of view the usefulness of bee-keepers' associations in the future will be the accomplishment of those objects that require united action—those that bring to mind the motto: "In union there is strength." Associations can accomplish things that are beyond the power and purse of the private individual. See what legislation has been secured for bee-keepers both in the United States and in Canada, through united action—through association. Foul brood laws, laws against the spraying of trees while in bloom, laws against adulteration of honey, the protection of bee-keepers in their right to keep bees, lower freight rates, etc., have all come from association. The Bee-keepers' Union stands ready to defend bee-keepers in their rights, to assist in the passage of needed laws, to prosecute adulterators, to help its members in any way wherein is required united action. United action, in the shape of exchanges, has done much for bee-keepers in the way of buying supplies and selling honey. It is in such directions as these that lies the work of associations in the future.

Mr. HALL: I think Mr. Hutchison's paper is a very valuable one. It tells us things we know and gives us a hint of what we are doing and have to do. Of the methods of bee-keeping in the past, of course, we have learned a great deal in conventions. The reading of journals is all very well, but we get no debates in them, and I think all the instruction we get at the meetings of this Association is practical instruction for the young apiarist. I think these conventions are beneficial to them in the instruction they may get from the older heads. Last night's discussion would have been worth twenty dollars to me when I started twenty-four years ago. When I commenced bee-keeping we had no bee journals. We had what was called a bee journal, but the management did not know what they were writing about, and they put us on the wrong track, and we lost money. At a convention if you do not understand what a man says you can button-hole him and ask him to explain it. It is a great benefit to the young men in this Association who are just starting, or have started, or intend to start, to have the practical old heads hit each other pretty hard knocks in good humor. The Association has been successful in obtaining a foul brood law, and this I feel is important to the country. We have also succeeded in obtaining a law against spraying, although it is not enforced as it should be. And, in respect to the adulteration of honey, if we report the adulteration to the Government, they will see the offender punished. We know we had a pretty good time yesterday afternoon in the social part. Sometimes the old heads get ideas from the young men, but for the old and young our present associations are doing a work, not to amuse only but to give men a chance of knowing and encouraging each other in their work. As far as prosecuting bee-keeping in the future is concerned I cannot say anything about it. I think in the future it will go on as it has done in the past and is doing in the present. The young fellows will come to take our places; others will want information, and they will simply do the work we have done with the assistance we leave behind. We leave the property to them, and they can go on and impart what they learn themselvee to the younger ones coming up, and I think the association work should be carried on for that reason.

Mr. DICKINSON: I think there is a good deal of truth in the paper, and there is quite a bit of truth in the remarks made in connection with it by Mr. Hall. We might think we know all about bee-keeping, and there is one advantage in coming to these conventions that we find out we do not know it all, and that there are other men who know just as much as we know, and perhaps more, and from whom we can learn something helpful to ourselves.

Mr. DICKSON: I like Mr. Hutchison's paper. There was one slight hint about our coming to these conventions—do not call them conventions at all, call them bee-meetings—

where we learn something about bees. That was the hint in regard to taking away information. I believe that is a fault with a great many of us. Something was said about scratching our heads when we get home and wondering where the information was. I I remember one man coming home last summer, and he said, "I do not know that I will attend our meetings again; when I get home I cannot remember anything." "Can you read and write?" "Yes." "Why not take notes?" When we attend our meetings we should take notes. I learned some good things here yesterday afternoon, and I am taking notes of things that I think will be helpful to me. Another good thing hinted at was the running to the journals when you find out something new. That is a mistake. If there is anyone who finds out anything new he had better try it pretty hard, and give it the fullest test, and tell us about it then. It has been the means of flooring many a one in the bee business by trying some of the things that came out in the journals. Sometimes we think we have found out something that was not really a success at all. I think we should encourage the ladies to attend, because—whether it is a fact or not—I give them credit for taking in more than we men do. I find it very hard to keep my wife at home when there is any other good work going on in the line of attending meetings.

Mr. NEWTON: I am sure I have always looked forward to our conventions as a pleasure, but I have always looked forward to having a profitable time. I like to meet the boys from winter to winter and spend a good time with them, but I always think of taking something home with me, and I generally do, that has been of profit to me during the convention. I believe the same in the bee industry as in most of the other societies—unless we keep in touch with each other in the different ways of working we will never make a success of our business.

Mr. MCEVOY: I think if we could tell of the mistakes we make as well as of the successes we have had it would be a sort of guide to others not to go and do as we have done.

On the motion of Mr. PICKETT, seconded by Mr. CRAIG, a vote of thanks was passed for Mr. Hutchison's able and valuable paper.

MARKETING OF EXTRACTED HONEY.

By H. G. SIBBALD, COOKSVILLE.

My experience in marketing honey may not be as great as that of many of you, but, as you know, I am not altogether responsible for being in the position you find me; therefore need not apologize. After having secured a crop of honey, it is of the utmost importance to the experienced bee-keeper, and not a little concern to the beginner, to market his product so as to have the largest return in dollars and cents. With this end in view, then, let us be sensible. If a large crop has been obtained, do not tell everybody about it; do not publish it in every journal you know of. If you do it will have a tendency to lower the price of honey, increase the number of bee-keepers, and, of course, cover you all over with glory as the greatest bee-keeper on earth.

Next, do not be in a hurry to sell your product. Wait until there is a demand for it. Occupy your time finding out all you can about crops in other locations. Take into consideration the fruit crop, and anything else that will affect the price of honey. Make up your mind to have a fair price, and do not get faint-hearted when the dealer tells you about the big crops of honey in California and the rest of the earth. Be in a position to jolly him about how scarce it is here and there; but if he wants honey he will soon talk business, and you will get your price.

After the small fruits are out of the market the demand for honey will commence. Supply your local trade first with a good article, selling at a fair retail price. See that the grocers in your nearest town or city are supplied with an assorted stock, say half pound jars, one pound jars, two, three, five, and ten pound tins, also some in bulk all nicely melted in liquid form. Charge them twenty per cent. less than retail price. If you have still more than this trade will be likely to handle, sell it to the wholesale commission merchant at ten per cent. less than grocers' prices, or look for an export trade.

Then there can be no cutting of prices, and all will reach the consumer at an even price. Be honest, give good weight, more rather than less If you sell by sample let the sample be a fair representation of your product, and that of the very best quality. In fact, make your customer's welfare your own, for the more he can sell the more you will be able to supply him with.

It was not my intention when I promised to read a paper on marketing extracted honey before this convention to go much into detail, but rather to place the matter before you with a view to organization of bee keepers for the purpose of selling their product so that an even and fair price might be maintained, and also that our honey might be distributed more evenly over the Province, and shipped abroad in a conservative and busniess like way. As we are marketing our honey at present, if a man in England wants 25,000 lbs. of honey he would not know who to apply to for it. Only a few months ago a Winnipeg man wanted 10,000 lbs put up in 5, 10 and 25 lb. tins, naming a certain number of each. I could not direct him to any one who would be likely to supply him. This ought not to be so. We ought to have a place where a reasonably large stock of honey is carried, and where dealers at home, as well as in other countries, could apply with a reasonable assurance of having their demands supplied. Business is being carried on in quite a different way from what it was twenty or even ten years ago. Now, large large business concerns are amalgamating, trusts are formed, companies seek monopolies, large departmental stores have sprung up and are flourishing. What does this mean? I believe it means that the old adage, "Competition is the life of trade" is recognized to be the death of the trader, and that people have more faith in combination being the life of trade; and for my part I feel that if bee-keepers had an organization and head-quarters for honey distribution, a bureau of information concerning honey crops, we would fare much better than we do, going it blind as it were, cutting prices on one another, selling our product through commission men who do not know clover honey from buckwheat, or basswood from bug juice, and whose only aim is to get rid of the consignment, get their commission, and be ready for another lot. One season those who sent the honey to the west did well; the next season everybody ships west and the market is glutted, prices down, bee-keeper disappointed. Another season very little is shipped to that market, not enough to supply the demand. One year shipments are made to England that pay well; another season when we are short at home and England well supplied by countries that were short the year before, we make larger shipments and come to grief. Can the members of the O.B.K.A. do anything to improve our condition in this respect? I believe it can, but will leave that for discussion.

The PRESIDENT: We have had a very interesting paper, in my estimation—one that is worthy of consideration and attention. Anything that commences to affect the public is worthy of note.

Mr. NEWTON: I am sure that it is a pleasure for me to be down as starting the discussion on the paper which we have had before us, because it is a very able paper, and there is plenty of room for discussion. The best recommendation we have for selling honey is to produce a good article to start with. If you sell a good article, and people buy once, they will usually buy from you again. If you sell something that is watery you do not often sell the second time. (Shows some samples.) Here is a sample which was taken unripe; you can see how soon it has granulated. This one is a ripe sample. The unripe will granulate far sooner than heavy-bodied honey. With reference to that thought concerning the Guild in our Oxford Society, we had talked over the formation of a Guild very much, and last spring it was the subject of one of our half day discussions, that we might collect honey together and secure a better way of getting rid of it than in the past. I know there are lots of things to contend with. We cannot get all bee-keepers to think of this point, because they would not attend bee-keepers' societies nor take bee journals, and if you try to persuade them they can get better prices by waiting a little longer, they will say, "We will do what we think," and when we come to sell we find the price is down. I think if we had small societies formed into guilds it would be beneficial. I do not believe in combines very much, but this seems to be the day of them at least, and I think we could get rid of our product to better advantage and divide it more equally than the way it is being done at the present time. As to cutting prices, it generally comes through these men that have a few hives of bees and who are afraid it

is going to spoil, and never think of waiting until they find out the demand for honey, but rush to the market and sell it. If these people would only wait a little while until prices were fixed I think it would be more satisfactory to bee-keepers in general and to themselves also. Do not rush on the market before the demand for it comes. Then we do not want to blow our own horn too much for fear people think there is such a large crop. I remember some years ago coming into a store in Woodstock and speaking to a grocer. It was a year when there was not very much honey and I gave him my figures. "It is too high altogether." I said, "Friend, there is not much honey in the country, and in a month or six weeks you will have to pay more for it." He commenced to jolly me, and I said, "Who gave you your information?" "Oh, the traders' report; they tell us everything." He would not buy from me. Three weeks after he wrote to me to send him 25 cases, and I sent my prices with an advance of ten cents a case, and he took them. Then we must look after the different crops of fruit, and govern ourselves accordingly. If fruit is scarce honey must come in demand to take the place of the fruits. As far as the local trade is concerned, I have alluded to that before, at other conventions. I think it is the main thing to look after our own home markets and keep them well supplied with a good article and not cut prices, and always give good weight. It does not pay to give short weight in anything. For the local trade I think the glass is more suitable, and in the liquid shape. For my own trade if they keep honey and it begins to granulate, I take it home and liquify it for them gratis; glad to have the opportunity to do so, because I think it pleases customers far better in the liquid shape. We are trying to educate them, but we cannot do it very fast. We ought to do what we can to please our customers.

Mr. DARLING: I feel somewhat interested in this discussion. One thought I have is with regard to the cutting of prices, and I do not know that we can get over that difficulty. I believe co-operation among bee-keepers would work as well as among any other class of individuals; but we have found, and we think we always will find, there are individuals who are a law to themselves. There was an old gentleman, a member of this association for two or three years, and he was in my house one day. I said, "You sell your honey too cheap"—and he did not bring a very bad article of honey into town, although perhaps not as nicely handled as a good many others. What was his answer? He says, "You fellows have got the honey and you sell it; they do not know anything much about me, and if I do not sell my honey cheap then I cannot sell it at all." There was one time we had better prices than now. I sold at ten cents, and I found other people were selling at nine cents. I had a pretty good supply, and I sold at nine cents, and then the parties sold at eight cents. Where will this go? As soon as they get our prices they will go and put it in a little bit under that. I fully endorse what Mr. Newton has said with regard to liquifying honey for the local dealer. I had an experience which I will relate: I sold some sixty-pound tins, and one man told me one tin was not as good as the other. I looked at it; it was really dark near the bottom. "What have you been doing with it? That is burnt." He said, "I will tell you; it got hard and I took it home and put it on the stove to melt it, and I put a little water in it because I thought it would burn, and after it had got melted up I was afraid it was too thin and I put a little sugar in it." (Laughter).

Mr. NEWTON: That just brought one thought to my mind. We had a gentleman at our Oxford convention this fall, and he was telling us about the thickness of his honey—I think it went 14 pounds to the gallon. Of course he thought he was giving too much weight for the money, and we tried to advise the man that was the best way to do it, as it would always hold the market. He had been experimenting and putting water in and trying to thin it down. I think the advice he got at our Oxford convention convinced him on that point. Then, as Mr. Darling says, the grocers are not bee-keepers, and they do not all know how to liquify extracted honey without burning it.

Mr. PICKETT: This is a thing that ought not to go out without explanation. The grocers will be placing your honey on the scales and it will not weigh fourteen pounds to the gallon. We must be careful not to put an estimate on our honey that one half of it will not reach. Our good friend is not saying anything so terribly amiss, but it is the effect that may follow. He knows as well as I do honey does not average that. As to this paper on marketing honey, I believe it is one of the most able papers that has ever-

been presented to this Association. I think our young friend is making his mark. I have been many years a bee-keeper and I speak from experience in this matter of selling. There are a few things we need to do: first, we need to be strictly honest. If a man asks you if you have ten thousand pounds of honey, if you have say so, but do not say it in such a way that it will be heard right down to Toronto. If you have a poor crop, say it in the same manner.

Mr. HALL: I am sorry the last speaker spoke as he did. He is a man I respect very highly. However, let me advise young and old never to offer for sale, except to a manufacturer, any honey that does not weigh fourteen pounds to the imperial gallon, or twelve pounds to the gallon, wine measure.

Mr. PICKETT: That gentleman is correct in his statement, but in the honey business most of us have been handling wine measure.

Mr. HALL: Then twelve pounds to the wine measure is very good honey, and if it is less than that it has something wrong with it, and we should let grocers know that twelve pound honey, wine measure, is good honey, and twelve pound honey will keep for years. I think good honey should be fourteen pounds to the imperial gallon, or twelve to the wine measure.

Mr. DICKINSON: I consider this one of the most important papers in connection with the bee industry, and hearing it read takes me back to two years ago, when the matter was being discussed of what we were to do with our surplus honey. I think the present state of affairs in connection with the bee-keepers generally through the Province has greatly changed since 1897. At that time, I think, we had a pretty good crop, and expected a very large crop the next year; therefore, it made us discuss that. If we have a large surplus it means the price must be low, and I had an idea at that time, 1897, that we might be able to put some honey on the British market if we could once establish there a reputation for Canadian honey. I had the opinion of a friend in Liverpool that there would be a very large demand, as the British people, when they give an order, give a large one, and I thought it would make a wonderful difference with regard to the amount of surplus we would have if we could once establish ourselves in the British market. With regard to how to market extracted honey, I undertook to try what could be done, as far as Canadian honey was concerned, in that market. I had letters in my possession that would discourage Canadian bee-keepers with regard to what Canadian honey would do there. However, I sent over my samples to my friend, stating when a man undertook to find new markets he must be prepared to take all chances, and I was prepared to let my goods speak for themselves. In 1898 I sent over a nice shipment. I was advised not to send less than thirty thousand pounds as a trial shipment. My friend said, "Do not send less than twenty-five cases." I sent that. I was very well pleased with the results. He has kept me posted with regard to what the market price is there, that is for California honey, and I think as far as my information goes at the present time that that is the honey the Canadian has to compete with in the British market. It is just as important in connection with marketing extracted honey to keep posted with regard to the markets of the world. I think you want to get to know pretty nearly as much as they think they know over there. No doubt you will be told there are large crops in Chili or California, which would have a tendency to make you be satisfied with a low price. I think a bee-keeper who is putting honey on the foreign market ought to be ready to take what the market allows in competition with the world, because if there is a large crop in California he certainly will have to take less for Canadian honey on the British market than if there was a small crop there. I have in my possession a letter which would satisfy any bee-keeper in Ontario how we stand in respect to quality. I will read it for the benefit of the members of the Association. This is just in two years. It is not necessary for me to tell the bee-keepers that it is imperative to send a good article. It is always necessary to sell a good article of honey even in your home market, and it is more important to send the very best clover honey into the British market.

"I have pleasure in sending you account sales for 78 cases of new Canadian honey, with draft on the Bank of Montreal, Hamilton, for £176.4, net proceeds of the same. I hope the result will be satisfactory. I sold it net cash terms, the buyers paying landing charges, namely, dock and town dues, master porterage, which makes the price about 47s. 6d., no other lot having brought so much. The highest price paid so far this season is

46s. 6d. The buyers are very much pleased with the quality, but thought we were rather stiff in the price. They expressed their regret, however, that they are not able to get more. Should you be able to get any more of equal quality, that you can ship at the price, we would have no difficulty in placing it. We hope there will be a larger crop next season, and, if quality is maintained, you will have no difficulty in getting a price equal to the best on the market."

I do not think we can for a moment imagine we are always to get high prices for honey in the British market, because supply and demand nowhere more affects the market. This friend sent me samples of Chilian honey. He had made a sale of three hundred barrels of Chilian honey. As soon as I tasted the honey I found my honey does not come up against that class of honey at all, and he would have to sell it for half, and he did sell it for 23 shillings. On the other hand I have a sample of California honey, and found that honey to be a superior honey to the Chilian honey, and it goes right up against first-class Canadian honey. Therefore, it will depend a good deal on what is their crop in California. I do not know so much about other foreign countries, but I know Chilian honey is an inferior article. Therefore, it is quite necessary to be posted on what the California market is before we can expect any great things. We will be governed by supply and demand in that matter. I think it is necessary for some of the largest bee-keepers in Canada to find a new market, and let the smaller bee-keepers get the benefit of the local market, and also keep the local market supplied all the time. By doing this the prices will be better all round. In good seasons we must ship out our surplus honey.

EXTRACTING WAX.

By Mr. J. B. Hall, Woodstock.

Allow me to introduce this talk by saying a little about myself. We tried the solar wax extractor, the Swiss extractor, the boiling and skimming process, and so on. All these things were slow and mussy jobs, and I thought I had pretty near all the wax out of some old combs I melted down. Mr. Gemmill was telling me how much more wax he got out of the refuse he had thrown away, and I thought he was mistaken. He was confident that I was wrong, and said, "I will send the machine down and you can try it." So, I said, "All right." His son, about 20, came down with the machine, and we had some refuse from the Jones extractor and the sun extractor which he saw lying in the yard, and which had been there eighteen or twenty months in the snow, frost and dirt, and the boy wanted to show off the qualities of the extractor and suggested we take that. I said, "All right." He melted it down, and he says, "You see the wax there?" "No." He got a kettle of cold water, and he took out the boxes. "Now, sir, do you see the wax?" "Yes." "You thought you had got all the wax out of that?" "Yes." "Do you believe that you had now?" "No." So, then, we tried after that some very old combs about eighteen or twenty years old, that had been used for brood purposes, and those I weighed, and I got 3½ lbs. and a trifle over, which I thought would have to be deducted for the soil or dirt. That was out of the one hive of old comb. That satisfied me. I have tried it considerably since then, and it takes out about one-third more wax than we can get out in any other known process that I have tried, and we take it out with less trouble, and I think I can take out eighty pounds a day. I have taken out forty-five pounds just part of the morning and part of the afternoon.

Now, as to the way to do this. (Explains with aid of extractor.) We first melt our combs in a pan on the stove, cutting the comb out of the frames and put it in here, and we melt one hive at a time; and we keep stirring it with a ladle. We have a kettle of water first put in, and there is a spout here so that the water can run out, and then we have this large canvas, which should be very open. We pull the pan out and spread the canvas on the pan. We stir the wax until just before it begins to boil, and then pour it on to the canvas in the pan. The water will begin to run into the pan. We then gather the canvas from the four sides so that it will be like a bag. Then we put the block on and screw down the screw. You will notice the arm of the screw is moveable, so that you can get a good leverage. When we get the block down we wait a moment be-

tween the last few turns of the screw- If we are in a hurry we pour a pail of water in, but afterwards you have to pour in a pail of hot water. We then take out our block and put it by the stove to keep it warm, and pull out the canvas and shake out the refuse in the canvas. We can get three packs of refuse in one day. One thing about this wax is it is very soft and pliable, not harsh and brittle. The cost of the machine is trifling—about $1.50. I have been saving my own combs until this winter. I am going to melt up sixty supers of comb, because I can get wax and give foundation in return. If it was not for this machine we would simply use them for extracted honey.

Mr. HEISE: What percentage of water do you add to the old comb?

Mr. HALL. It makes no difference. The more water you have the easier it is to get it out. I have my boxes two inches deeper than the box of this extractor.

Mr. MCEVOY: Do you think you would double the wax that you would get out of the Jones steamer?

Mr. HALL: One third more, with one sixth the trouble.

Mr. J. D. EVANS: Do you use it in the first instance, or for the refuse of the other extractor?

Mr. HALL: In the first instance. It would not pay with the refuse of the other extractor. I made one this summer, and made twenty-eight pounds of the refuse of what I usually throw away.

Mr. MCEVOY: You made foundation from the wax made from them?

Mr. HALL: Yes, sir.

Mr. MCEVOY: Did you notice any difference in that wax sagging more than the ordinary wax?

Mr. HALL: I cannot answer you that.

Mr. MCKNIGHT: Suppose we used a screw, such as used in ordinary cider mills, would we get more wax?

Mr. HALL: I do not think you would get more wax, but less labor. You get a better sample of wax with this extractor, but it is soft. I do not know whether that is against it.

Mr. CHRYSLER: In regard to soft wax, I do not think there is any supply dealer or comb foundation manufacturer that will object to the wax on account of it being soft. They can get it so that it won't be too soft, if necessary.

Mr. HALL: You can counteract that?

Mr CHRYSLER: Yes; it is easily got rid of.

Mr. MCKNIGHT: Suppose low pressure was employed to harden, do you think the foundation itself would be as strong from that wax as from ordinary wax?

Mr. CHRYSLER: It would be making foundation improperly to do so.

Mr. HALL: I know for sections the bees accept it quicker than they do hard.

Mr. DICKSON: Is there any one here has had any experience in using foundation wax from that machine?

Mr. HALL: I don't know as to that. I know it was all right in cool weather. (Turning to Mr. Newton.) Do you know whether foundation made from this machine sags?

Mr. NEWTON: I could not say. I only say I could not mill it at the same temperature as I could mill harder wax. I was speaking to a gentleman and his experience was similar to what mine has been.

Mr. MCKNIGHT: What is the cause of it being softer?

Mr. NEWTON: I once thought probably the pressure on it. Whether that has anything to do with it, I don't know.

Mr. MCEVOY: If that wax is taken and put through the Weed process you would find that foundation from the Weed process would be a great deal tougher, because it is made on the principle that the more is it worked the tougher it is.

Mr. CHRYSLER: The Weed process and this process is not to be compared at all. The Weed process deals with the grains of wax, and this with the wax itself. It will squeeze out more of the very, very fine dirt, and there is some of that incorporated with the wax and by re-melting in the way I do in refining my wax you will get it just as good, and the same texture as any other was I ever got. I have tried this same process a little different to what has been tried. I have used probably one half barrel of water so that my refuse would go in nicely before it is pressed, and the product I had was very

light in color, and as far as texture goes it was no softer than the average run of wax. The greater quantity of water I used I account for affecting the softness of the wax.

Mr. NEWTON: I think, as far as its use for foundation is concerned, it is just as good as the other.

Mr. HALL: I find no difficulty whatever in milling and no difficulty in sheeting. Whether it would stretch with full sheets in the large frames I do not know; but for foundation for sections it is just the wax. It has a better smell.

Mr. McEVOY: All wax made from old comb is softer than in capping.

Mr. HALL: Then, this has nothing to do with the sagging.

Mr. DICKINSON: Would wax that I would take from old combs with this process sag any more than the wax from the same combs with the other process?

Mr. McEVOY: I do not think it would.

Mr. SHAVER: Your wax will be a little softer.

Mr. CHRYSLER: All wax will sag to a greater or less extent with the bees working it. The grains are just as good in that wax as in any other, and they will not slip past one another.

Mr. DARLING: With regard to softness and hardness of wax, take wax from a solar extractor, and it is harder than that rendered by either steam or water. Mr. Chrysler, over there, says he can manage the wax even if it is soft. I suppose he is one of those who melts his wax dry. Some say never let a drop of water touch it. If this wax is likely to be too soft, for either one reason or another, I would advise people to have a solar extractor, and use it to have this hard wax to mix with the soft. There is certainly an advantage. If I had 500 colonies of bees in five yards, and had a press like this in every yard, I would have a solar extractor in every yard.

Mr. McKNIGHT: Do you know why wax from old combs should be softer than capping?

Mr. DARLING: I do not know.

Mr. CHRYSLER: I did not say how I would fix this wax to make it suitable for making foundation, and Mr. Darling has supposed that it would be done by melting with a dry mill on making the foundation. If I found any I thought was too soft in that manner I would melt it up by steam in the way I refine wax; I would thoroughly refine it, as I do ninety per cent of all I use. There is no more than ten per cent. of wax that I get in but what is thoroughly refined by steam and a small quantity of acid. I then get it as near perfect as I can generally see wax by that way, and it then is melted for foundation dry and kept so until it is thoroughly done.

Mr. DARLING: Then we understand that all wax that is refined by the acid process is harder for being refined.

Mr. CHRYSLER: This propolis, or pollen, or dirt, whatever it may be, that causes this softness, that process will remove; and we do not care very much what it is from as long as we can successfully treat it.

Mr. DARLING: That is, the effect of refining with acid makes the wax harder?

Mr. CHRYSLER: Oh, yes; that is, where it is too soft, but where it is real hard I have not found it to make it appreciably any harder.

Mr. McEVOY: Because it is softer wax that is no detriment to it, because bees will use it up quicker; the only detriment is in sagging, and that is easily got over by using wire.

OUR OWN AND FOREIGN MARKETS FOR HONEY.

By Prof. J. W. ROBERTSON, Dairy Commissioner, Ottawa.

This is the one Association with which I have had least to do of all the associations of men in Canada who are working for the development of our natural industries. So I came more to learn than to give you information. However, I must say this, that I recognize that the bee-keepers of Ontario have been doing capital work, not merely for the commerce in bee products, but for the people of Ontario, who have been improving their farms through growing clover. That is outside your business, perhaps, but I know a good deal more about clover than I know about bees. Then, I recognize this further, that one of

the main means of improving the status of farming in Ontario to-day is through the growing of clover crops. There is no means now whereby the fertility of the fields in this Province can be renewed economically except by growing clover. I need not detain you with a talk on farming, but I will mention one experiment conducted for thirty-two years with the growing of clover between grain crops, and the average yield was 114 per cent. of grain more where clover went between the grain crops. That is thirty-two years work in one of the fields of England. That is not a little thing ; it is one of the big things of the Province to grow clover. It is not always possible to get the clover into blossom as pasture for bees, but many of the pastures in Ontario would have more food for bees of various kinds. You cannot grow clover seed without the fertilizing action of the bees on the blossom, because where clover plants have been screened in from bees the seeds do not form, because the germ is not fertilized by the pollen at the right time and the right way. I will speak a little this afternoon on the home and foreign markets for honey. I have watched the home markets a little bit, because I have to, in looking after the markets for agricultural products, and I learned that in Ontario and in other places in Canada there is a very large market that is not nearly met by the products that are in abundance in the country. I think one of the best markets for honey is what I would call not merely the home market in Ontario, but the personal house market. Honey is one of the things for which every housekeeper will pay a bigger price direct to the producer than any other way. Just a word as to the essential difference between the personal house market and the general market. There is a general market for wheat, and by the very greatest of care a man can raise about two cents to the bushel. In the personal house market anybody can raise the price fifty per cent. in any product. We pay thirty cents a pound at the house for butter —paying twenty five cents all last summer to a woman who brought it from her house in the country. By making the things dainty-looking as well as excellent the personal house market will give you a big profit, and honey is one of the things the producer can afford to take to the house of the consumer. Some people in the Province of Quebec have been sending me samples of mustard and clover honey which they are going to send to Paris. I pay them twenty cents a pound for those samples. I took a sample to my wife, and I have consumed more honey on my table in the last month than in the previous twelve. I have guests there at my table and they go back and say, " We will get honey." Honey is a thing you cannot get in the best condition in the retail stores. There is an unexplored market to the people who will supply it to the houses in towns. That is true in regard to everything I have touched—true of dairy products and fruit, and it is true of honey so far as I have observed the market. Then there is a general market, which means that the one that supplies that market takes the general average price. If the bee-keepers would say to two of the leading shop keepers in every town of any size, " Why do you not handle honey ? we will supply it to you," these people could push honey and the customers would take it. Commerce has got into this line in late years, that the article which gives to the shop keeper the least trouble, the largest profit and the easiest turn over is the one that sells, because he advised them to take that. I have gone about with old clothes into the shops of England many times when I looked into the markets there for Canadian products, and the shop-keeper would advise me to take something that was in a very easy package. If you could spend one half day in each town and just get the man to take these little packages you would make an unlimited market for the honey. I am not saying anything more than to just indicate these lines.

In regard to the export demand, there is no market in England for honey of a common quality at more than four cents a pound. There is plenty of honey offering in England, at about four to five cents a pound, common, cut still honey, and said to be pure honey. There is a very good demand in England for exquisite honey, of good body and of fine color, and the English people do not object to a little yellow tinge in the color, at about 15 cents a pound in the original packages, retail price. Again, you see there is a tremendous glut of the common stuff, but there is a scarcity of the very nice stuff done up in nice packages. Just an illustration—three days ago I had a letter from England. I had asked an agent there to buy three packages of the nicest apples he could get. He bought three packages of Fameuse apples sent from Montreal, and they cost him 21 shillings a package, plus 1s. 6d. for carriage—that was 22s. 6d. for Canadian apples with little more than a bushel in a package. They were sold by the Army and Navy stores, which are, perhaps, the biggest retail dealers in London. In the same letter he sent me a report

from Bristol, where he had been a week before, that he saw a large quantity of Fameuse apples in barrels, and that they were being offered at six shillings a barrel and could not be sold at that; whereas I had paid 22s. 6d. a box for apples, and there was not enough of that kind of apples to go around. It meant I had paid as much for the box as they could get for three barrels and a half of the same things, but not selected. We had some honey experimented in England two or three years ago which did not much more than pay commission charges, because they said it had a peppermint flavor, and if there is any kind of thing that an Englishman can hang an objection on he will find it; but if it is the best quality he will give you the best price all the time. I know of some honey sent last year to England that sold readily at fifteen cents a pound in pound jars. The two members of that firm were in Canada last fall, and they said, "We have a good demand for honey which is put up in nice packages and looks nice on the outside as well as on the inside. If you need a market in England you can get a good market for honey of excellent quality in nice small packages, preferable one and two pounds glass jars. It is hard to get a sale in England at anything like a good price that you merely just put on the market as a job lot. There must be regularity in the supply and regularity in the quality. An Englishman never wants anything more than what he is satisfied with. The success of nearly all large things that go to England—in bacon, cheese, butter and flour—is to get a first rate good thing, and then stay at that dead level, and they will have no fault to find. If you can do that in the English market with your honey you can get a good price.

The only thing you are interested in in sending honey to Paris is the impression that may be made on the British public through the exhibition. We expect through the exhibition to attract a great deal of notice through the English press, because they will have special correspondents writing up exhibits, and we expect to make that a feature of the exhibit from Canada, the recognition of that by the British. Apart from the business aspect altogether, a very fine display of good honey from Canada would give a new phase of commendation to the country's resources, and would give the country a good name, and it would attract population, capital and travel this way. I do not think we need dream of having such an exhibition in Paris as in London in 1886. There is not the space available as then, and the space will be comparatively small, and the response to applications for supplies of honey have been so generous and general that we have been lately refusing exhibits and cutting down the quantities by one-half, and sometimes one-quarter, because it is not possible to find room for all the honey that is being offered. We have been offered altogether something like three or four tons of honey of very good quality from New Brunswick, Nova Scotia, Quebec, Ontario, and I think two lots from the far west. We have some honey arranged for in comb. Most of the extracted honey is to go in large packages and be liquefied and properly put up in attractive glass vessels in Paris, so as to make a good exhibit there.

I came, after all, to learn from the Bee-keepers' Association in what ways our Department can serve you than to give instruction. If you can indicate any way in which our Department can be of any use in helping to exploit the home market, or in meeting the foreign market, I think we will be very happy to do anything we can to help you; and if there is anything we have not done in connection with the Paris exhibition which can still be done we will be very glad to hear suggestions from you in that respect. So far your President has not allowed me to forget the honey part of the exhibition, but everything he has written has been directly along the line, and on the point of giving suggestions. I think it will be a splendid display and of benefit to the honey industry in Canada.

Mr. EVANS: I have been waiting for a year to ask Prof. Robertson a question. I would like to know did the Government last year ship forty thousand pounds of honey to England or was it handled by one man, and did it net twelve and one-half cents a pound clear of expenses?

Prof. ROBERTSON: Last year the Government did not ship any honey at all. There was no honey sent by the Department. Last year—that is, 1898—when I was in England, I had some correspondence from Brantford telling me that a shipment of honey had been made to a firm in London, and they complained of the quality; and they asked me if I could not look into the subject when I was there. I did give enough time to earn that the complaint was that the honey had a very decided peppermint flavor and

odor. It was not saleable at a good price. Then I made enquiries as to whether they could not handle honey, and I got the names of two firms who seemed to be in the best position to handle honey. I gave the names to Mr. Hall and others, and some of these people sent honey themslves direct to those firms, and we never got an official report from the firms or from the senders; but I got some letters about the thing, not officially, and one of them told me that the pound jars were selling for fifteen cents a pound, and there was a good demand for honey in those jars. I will give the names of two or three firms in England to anyone who would like to know.

Mr. EVANS: Did the Government ever ship any to the old country?

Mr. ROBERTSON: Not the Dominion Government. We did not ship any honey, but we took part of that shipment in England and gave it away. We paid for it, of course. I think I arranged to take about 200 pounds of that honey on Departmental account. I sent some, with our compliments, to editors of some of the newspapers, in order to get them to write it up. We did not handle any honey in a commercial way.

Mr. DICKENSON: With regard to Prof. Robertson's remark in connection with the packages, from information I can get, it is not best to send it to England in glass. They asked me in what shipments I made to send it in 60 pound tins, as they melt it up and put it in the glass themselves. The reason they gave was simply it would not be convenient to have glass shipped such a long distance, and there would be a very great danger of breakage. I do not doubt but what the glass would be the best if we could get the glass there, and that it would bring fifteen cents a pound; but I prefer the sixty pound tins, with no loss, to run the risk of the glass.

Mr. MCEVOY: As to the Paris exhibit, will the honey sent from all the provinces of the Dominion be permitted to be changed for some of next year's crop? This season has been very poor in some places, and the quality of the honey will not be as good as usual; and I think we would like to replace the honey with some of next year's.

Prof. ROBERTSON: It has been arranged that all products may be replaced through the course of the exhibition, and if any exhibitors will supply honey of next season's crop of superior quality the Department will arrange for transportation of that and for the replacing of the others in Paris. (Applause.)

Mr. HALL: That is quite necessary in the case of comb honey. Comb honey, by going over on the vessels, may be injured. Comb honey has a great affinity for water, and it will absorb it; technically speaking, it sweats and bursts the capping, and runs, and does not look well. Comb honey, to keep, must be kept in a very dry and warm place. I think we can supply a better quality next year.

Prof. ROBERTSON: The reports I had from England were against sending comb honey for commercial purposes, because it was too risky, and too many of the sections were broken, but they did not complain of any of the honey in glass arriving in a damaged or broken condition; but if anyone could have an agent in England who would refill the glass bottles from bulk there, that is the safest and cheapest way. One firm in London say they will do the refilling there and charge only for the bottles and labor. That is George Nicholson & Son.

Mr. CRAIG: I know a little of this manner of packing and shipping in glass, and certainly that is a feature that is perhaps against us in sending honey in that form to the old country. The glass is expensive and the manner of packing costs a great deal, and it takes away a great amount of the profit we would otherwise derive from it.

Mr. DICKINSON: Is it desirable to send this kind of honey that the Englishmen complained of being flavored with peppermint? I have got some correspondence in connection with that matter now in my possession, and I cannot think it is anything else than our honey from basswood. We call that first-class honey in Canada.

Prof. ROBERTSON: I have been advised even to send buckwheat honey to Paris. I refused to send large quantities, but I have sent some. Some have advised sending buckwheat honey to bring out the qualities of the honey by contrast.

Mr. DICKSON: How is it in small tins, such as two and a half or one's and two's?

Prof. ROBERTSON: I am afraid I could not tell you, but I will tell you what I will do. If you will write me at Ottawa I will give you the names of three of the best firms in England with whom correspondence may be opened before the season opens. One firm in Liverpool are interested in Canadian products. They have forty travellers, and they are willing to push Canadian goods. They have recommended one or two pound

glasses. I will submit to them the question of tins and obtain information from them and forward it to any medium which will reach you all.

Mr. COUSE : In what way will samples be judged that are being sent over to Paris ?

Prof. ROBERTSON : I am not able to say what the action of the Department will be: Those of us who are Commissioners have advised the Commission as a whole to appoint experts for certain classes of works, and I have advised the appointment of a special honey expert, both to have it examined in Canada and have it put up in Paris, and be mainly under his care. Then, the name of every exhibitor of honey is going on the official list, and whatever award the Government may get for this joint exhibit will be made for the joint exhibit with the name of those whose honey composed the exhibit, and then a copy of that will be sent to every exhibitor.

Mr. MCKNIGHT : Respecting the question as to the popularity of the smaller tin vessels for the sale of honey in England, I do not know what revolution has taken place in the tastes of the people over there in 13 years, but I know at that period such vessels were not profitable to the bee-keeper to put in for the simple reason that the same quantity of honey put in glass vessels would bring a greater price than the difference between the cost of the tin and the cost of the glass. The customer there generally buys in small quantities, and wants to see what he buys, and it is not convenient to show honey done up in tins. I may say for years I put all my honey in glass vessels until honey got so cheap it was not profitable to do it. I imported from London pound glass bottles, such as are generally used in England for putting up honey. They cost me £1 a gross in London in five gross original crates. If honey is put up in glass here you would have to import the glass, pay freight and duty, and then freight again to England. If an arrangement could be made, as suggested, so that some responsible and reliable firm over there could be got to do that work and provide the necessary glass vessels it would save that extra expense, and I have not the slightest doubt but this arrangement could be made. Prof. Robertson has brought out the point that we must do something that will cause honey to be regarded as a staple article for all time—the uniform supply for the uniform demand. The nature of the bee-keeping business is such that the producer cannot meet this condition. There is only a limited portion of the year he can produce it at all, and those who are not acquainted with honey-producing give no thought to this fact at all. While we may be able at a certain time of the year to supply the necessary demand, the lull comes, and the market has to be worked up each year, That will be the case until someone takes hold of the honey and supplies the market regularly and continuously.

A vote of thanks was tendered to Prof. Robertson for his suggestive and profitable address.

MANAGEMENT IN EXTRACTING SEASON.

M. B. HOLMES, ATHENS.

The mangement of an apiary during the extracting season is perhaps the most interesting feature in connection with the care of bees during the whole round year—interesting in the various ways and from the different standpoints.

The amateur is enthused at what seems to be the discovery of a connecting link between nature and art. The strict regard shown by the bees for perpendiculars, horizontals and regular angles in the construction of the honeycomb, as well as accuracy in spacing, and all without the aid of a square, plumb-rule, or trowel, arouses within the breast of the apprentice who has "entered upon" this ground with indifference, the desire for light and advancement until he shall become "a master" of the work. The novice receives fresh stimulus as he sees for the first time the perfect order and discipline under which all operations in the line are conducted, and the neatness, cleanliness, economy and industry so studiously observed by the little workers themselves.

The master in apiculture at the opening of the season under consideration notes with great satisfaction that each colony of bees has its thousands and tens of thousands already mobilized and fully equipped for service under their queen, ready to move when the order "forward" is given, and possess themselves of the rich treasures in the adjoining territory, and that without any blare of trumpets or display of bunting.

At the opening of the clover season, the appearance of bits of newly-made comb in the upper portions of the hive tells us that more room is required; the new comb referred to is easily recognized by its pure whiteness and freshness of appearance. We now proceed with the least possible delay to furnish all colonies which thus indicate that they are overcrowded with supers of drawn comb. This is of no inconsiderable importance, as a delay may mean the issuing of a swarm from the colony so neglected. Having placed supers on all crowded colonies, we now give attention to the less congested colonies, until all are supplied with good combs in which to store the rich and delicious nectar just now being distilled in nature's gorgeous laboratory, the clover blossoms.

In our work we find that the use of perforated metal queen excluders is necessary in the case of new swarms, that is, colonies that have occupied the hive but a short time; older colonies will generally occupy the combs with honey before the queen finds her way into the super. We now await developments, and if the conditions are favorable the extractor will very shortly be called into use.

A passing notice of our "honey hall" may not be out of place just here: An ordinary clapboarded building, 12 feet wide by 30 feet long, sealed inside with narrow ash boards, dressed and nicely matched, well lighted and well ventilated and furnished with as good an outfit for our work as can be purchased on the market. This gives you a sweeping glance at our extracting and store-room, and I would only add by way of suggestion that every extracting room, or place where honey is handled, should be kept scrupulously clean and have a cool and airy place where callers or prospective customers may sit and read the *Bee Journal* or the daily papers while they sample your delicious honey, and every manager should always be presentable and courteous to a degree.

When the supers are filled and combs pretty well sealed, we proceed to extract the honey. The uncapping arrangements, reversible extractor, honey tanks, etc., are placed in position, comb box with full set of combs got in, smoker lighted, and we are ready for operations. Carefully removing the cover and quilt from the hive where we wish to commence, we blow a little smoke over the combs, just enough to frighten the bees and start them down toward the body of the hive. The full combs from the super are now removed, the bees brushed from them in front of the hive, and empty combs from the comb box inserted, and all done so quickly and quietly that no disturbance is created and work goes on in the colony as if nothing had happened. We now proceed to the honey hall, uncap and extract the case of honey, return to the yard, and treat the next colony in the same manner, and so on until all have been relieved of their honey. This operation is repeated as often throughout the season as occasion demands, the favorable climatic conditions prevailing in some seasons rendering it necessary to extract a number of times, while in seasons like the one just closed the work in that particular is remarkably light, and the crop of honey correspondingly so.

As the honey-flow from the buckwheat and golden-rod bloom draws to a close we remove all supers and extract the honey, and at a later date the supers are placed outside for a day to allow the bees to remove the little remaining honey, which leaves the combs dry and in good condition to be stored away for next season's use.

Returning by way of review to the first days of extracting, I would say that the close of each day's work should find all honey drawn from extractor and put in the storage tanks, over the tops of which there should be stretched a couple of thicknesses of cheese-bandage to catch any small chippings of comb which may chance to be in the honey. Each succeeding morning should find the cappings made on the previous day (and not already rendered) snugly tucked away in the solar wax extractor, so as to get the full benefit of the sun's rays.

The honey knife should always carry a "razor-edge," as anything short of this does very unsatisfactory work. The knowledge of the honey-extractor's use can be gained only by experience, and the only suggestion I would offer to the beginner is, "start slowly and study well as you advance."

Mr. ARMSTRONG: Mr. Holmes says he furnished all colonies which indicate they are overcrowded with supers of drawn comb. I would say use drawn combs if you have them, but if you have not, then full sheets of foundation. In another place he says the use of queen excluders is necessary with colonies that have occupied the hive but a short time. I want the excluder on at the same time as the surplus arrangements go on

Then he goes on to say that the extractor "will shortly be brought into use." I would not bring the extractor into use until the end of the white honey harvest, or eight or ten days after. As to the honey hall I think he has erred a little on the size, but on the right side. A building, half the size will do for 150 colonies. He also says to get a good outfit. I would agree with him there: get the very best in the market. Do not buy cheap clap-traps, because you get them for little money. He says to carefully remove the cover and blow in a little smoke. I say, give it to them full blast. He did not tell us how he got his honey from the yard to the honey house. He says then to place the supers out in the yard for a day. I would say, do not leave them out over night for the moths to deposit their eggs in. With reference to that I was going to ask Mr. Hall if he ever had any difficulty in leaving them exposed to moth over night?

Mr. HALL: They are never put in. They are on the hive three months, and off the hive, exposed to the flies, the spiders,—not to the mice—and covered from rain and snow for nine months of the year.

Mr. POST: Mr. Holmes has been accused of making a slight mistake in extracting his honey. If I understand the paper rightly he extracts his honey when the bees are all on it, just the time it is finished and capped.

Mr. HOLMES: Yes.

Mr. POST: Then, I infer, Mr. Armstrong, you raise your supers and keep raising them until honey season is over?

Mr. ARMSTRONG: Yes.

Mr. POST: Ten days after the honey season ceases the bees will shrink back from the top supers, and as honey has an affinity to absorb water, and if the weather turns a little cool, the top supers will not have nearly as good honey as if extracted when it was covered with bees and warm. I claim Mr. Holmes' system will give the best honey. Extract it, place it in a barrel or some tight receptacle.

Mr. ARMSTRONG: Perhaps it is the locality. My honey season closed about the 12th or 15th of July, and it is left until the 20th. I may say my honey gives 12 lbs. wine measure, and I have had no difficulty in getting that weight.

Mr. NEWTON: I think our friend, after the information we have had to-day, will never be able to send his honey across the ocean unless he changes his method of working, because he says he never takes any honey off till the white honey is in, and, of course, he has his basswood and clover honey together, and they do not want that kind of honey on the other side of the ocean. I have not any reception room in my honey house.

Mr. ARMSTRONG: I do not get my honey mixed up; I get my clover separate. If I find I am going to have a flow of bass-wood my white flow of honey comes off.

Mr. MCEVOY: Mr. Holmes lives in one part away down in the north-east of Ontario, and Mr. Armstrong lives away in the south, and it is a great deal warmer there, and the time he takes it there is all right, and the time he leaves it on would not do in the other place.

Mr. DICKINSON: I agree with Mr. Holmes with regard to taking off the extracted honey at the time it has ripened. There is a great deal to be gained by taking it off then, and nothing to be gained by leaving it on. You can get bees to accept combs that are slightly extracted much quicker if you take off the honey that is nicely capped, and give those combs back and they will go right to work lively. Another feature is to be sure there is not a particle of bass-wood honey with your clover honey. Therefore, it would be very necessary for me to have all the clover honey off I was going to take, not to say that I would take off all the clover honey that is there, but all the clover honey that is capped would certainly come off as soon as it was capped if I could find it out.

Mr. HOLMES: That is the plan I follow, and I follow it just as closely as possible, removing the clover honey closely as possible before the basswood honey comes in. In Mr. Armstrong's criticism I think he did not catch my meaning in my reference to the queen excluders. I intended to say that young swarms—those that had been occupying the hive only for a few days—got the excluder; and, of course, they get it immediately before the super goes on.

Mr. EVANS: I understood from Mr. Holmes that they take the supers of one hive and extract them and put them back before they touch another hive. It seems to me

that would be very slow work. I take eight or ten of them into the honey house, and if there are any robber bees they get quited down before I come back. I suppose Mr. Holmes' object is that each hive should have its own frames back again to prevent the spread of disease; but it seems to me that is a tedious way of doing business. As to the size of the honey house, I think Mr. Holmes' is not too large. I have a two-story house, 20x30, and I find it none to big; and I find that one of the things you should have is plenty of room in the honey house.

Mr. DICKSON: Does Mr. Holmes put on a queen excluder down on the old colony?

Mr. HOLMES: No; I do not find them necessary.

Mr. DICKSON: In my case we do. As regards the honey room I have no doubt it might suit some to have a large one. Mine is not. Possibly mine would be a little too elaborate for its size to some. Mine cost considerable, but there was money in it. As regards putting my honey when into extracted into a barrel I cannot agree with that. My honey room is 15 x 18 feet and it will hold four tanks and everything comfortable and nice. You cannot stay in there on a hot day, because the temperature will run up to 125°; and in connection with this same room I have a steam apparatus for any liquifying we may have to do. The tanks are covered with cheese cloth or cheese binder, two ply, and right above there is another screen to keep the under screen clean. But flies occasionally will get in and fly around, and you know what the flies will do. It is not long until you get your covers soiled. Also in this same room I have above that again what you would call a shelf to store away the honey when it is packed. This room is very elaborate, but I consider it a room that pays me, and I can produce a first-class quality of honey. It is a room that a good many have tried to see, and have failed, for the simple reason that I have a notice on that door, "No admittance here." I had bee-keepers very anxious to come about ten years ago, and who tried a good many ways to see it. I think, however, in our day human nature is inclined to yield a little more, and so the last ten years I have been more inclined to let bee-keepers see what I have there if they come in a proper way to see it. As for a large honey room I will not agree to that, because you must have heat; nature's heat is what will cure honey in first-class shape. In regard to taking in the comb one box at a time I think that would be very tiresome when extracting 1,700 pound in a day. We have gone as high as that; but we just begin and take of as many as 20 and 25 and 30. Of course we have a big supply of combs to do it, otherwise we could not do it.

Mr. CHRYSLER: It might be profitable to some to know how Messrs. Holmes Brothers obtain their extracting combs to get them drawn out; how they get that quantity, and how they get them in the first place; and also how the uncapping is done, and what kind of arrangement they have for catching the cappings.

Mr. HOLMES: That is a point that was passed very lightly over in the paper—how the combs are obtained. They are obtained by the use of full sheets of foundation in the supers in the first place; and I might add, in case of being short of combs we insert odd frames filled with foundation here and there throughout the supers. We get them drawn out in that way.

Mr. CHRYSLER: Supposing you get about 50 to 100 the first year, and the second you wanted to take 400, would you advise putting in two or three of the drawn combs, and the balance foundation or starters? Would not starters answer after you got one to start?

Mr. HOLMES: It may be that starters would answer as well. I have used the full sheets, and, therefore, I am not able to speak as to starters. With reference to the manner of uncapping I do not know whether I can describe the uncapping arrangement. However, it is a frame work that holds the comb, and the cappings drop into a square tin arrangement, that is a little lower on one side; that gives the liquid honey in the capping a chance to drain out.

Mr. CHRYSLER: Some time ago there was a great deal of discussion upon bees wasting the wax, and if they have extracting combs all the time without having to build any they will waste that wax, and I have considered it advisable, where chances are good, always to keep fresh frames with starters, probably one or two.

Mr. HOLMES: I might say in that connection I wish to give my bees the very best possible chance to take every advantage while the light honey is being stored; when the fall flow comes on golden rod and buckwheat I then give them more of a chance to work. I get a good many of my combs drawn out on the fall flow.

QUESTION BOX.

Q. Does the mating of the queen affect her drone progeny?

Mr. HALL: I suppose by that is meant is there any possibility of the young drone having any of the characteristics of the queen?

Mr, POST: We are told it does not, and I don't believe there is a man in the room that actually does know.

Mr. HALL: I do not know. My conviction is that they take after their grandfather. The only way I have of judging of that is from the marking of the progeny of that queen. If the grandfather has any Carniolan blood in it the queen will produce some pretty Carniolans, if she is an Italian queen she will produce some like herself, and all grades between mullatoes, darkies and whites.

Mr. HEISE: Carniolan bees—is that the worker or the drone?

Mr. HALL: I mean both; but the drones do not take after their father in their characteristics or in their color; that is my observation. My observation may not be true. It should be answered by other people, because one man's opinion is not sufficient. For example, in one case in Detroit I was very anxious to know if the bees would winter in a cellar, and I asked the question, "Does the furnace affect bees in the cellar in an adjoining room?" The answer was simply, "Yes, and not beneficially." My experience since then is that it effects them beneficially. If a man gives his opinion without any other discussion you may get the wrong opinion.

Mr. STEWART: You have partitioned off your cellar with a furnace in it. I have a cellar I cannot use for bees on account of it being too warm; the thought came to me, if I put a brick wall through the centre could I use it for bees?

Mr. HALL: It would affect them beneficially; that is the way mine has done.

Mr. WALTON: Surely we as bee keepers are endeavoring to promote apiculture, and I think nearly all the interest centres around the queen, and is it not necessary that we know something about the mating of that queen, considering her progeny?

Mr. HALL: I have given you all I know about it.

Mr. HEISE: According to what we have accepted as an established fact that the drone egg never comes in contact with the male influence, consequently how can it be that the drone progeny can possibly be effected by the mating of the queen? If that is not true it alters the circumstances. Some are now questioning whether that is a fact or not.

Mr. HALL: Are you not one of that class who doubt it?

Mr. HEISE: Not in the least.

Mr. HALL: I doubt it, and I have doubted it all along. It was said that the drone egg was unfertilized, and the mating of the queen does not apparently affect that, because we take it for granted the father of the drone is the grandfather.

Mr. WALTON: I would like to know whether bee-keepers would like to breed from unfertilized drones? For my part, I certainly would not. It seems to me it is something we ought to understand if we are raising queens for our own use. How do the other breeders look at the matter?

Mr. HALL: They look at it that the drone has no effect on the drone progeny of the queen, but we must look a little farther on for the next crop of queens we get; they affect the second crop of queens. If the drone bee is the grandfather as well as the father of the drone, is he not the grandfather of the female or of the worker bee? He is the father only of that. Then, when we go to raise queens or bees from the father in that progeny, we shall get the blood. I have a record slate on every hive. I have the age of the queen when she was clipped, and when I saw her last. I use the letters A., B., C. C. is killed at once, B. is killed when I can do so profitably, A. we do not breed from. With A. 1 we do sometimes; A. 1 X. we breed from; A. 1 X. X. we mark to raise queens from the next year. I could not raise them to sell that way unless I got two or three dollars each for them.

Mr. WALTON: I have been selling at a dollar each, but there is not anything in it.

Mr. HALL: Not if you raise them that way.

Mr. WALTON: If the second generation of queens is affected possibly the first is, but not so perceptibly.

Mr. HALL: Yes, we cannot notice it.

Mr. WALTON: It must be there.

Mr. HALL: Yes.

Mr. WALTON: I think it would be well for all bee-keepers to have their queens mate with good first-class drones.

Mr. HALL: That is another question. I cannot tell you how to do it.

Q. What is the best method of handling swarms so as not to increase the number of colonies?

Mr. HALL: In 1883 we took 25,000 lbs. of honey on that principle; we had more swarms that season than ever we had. In one apiary we had 80 colonies, and we increased to 84; in another 120 colonies and increased to 128 colonies. We had an abundance of swarms; the first part of the season we hived every swarm on 4 combs and 4 foundations (4 sheets to the pound), placing the stock alongside of the swarms. Six or seven days after we shook all the young bees that had hatched in that time into or in front of the swarm, making it very strong, and took this brood away and hived a swarm of bees on it. There were no eggs and little or no uncapped larva. In that case every swarm of bees we put into those combs stayed and went right to work; we carried that out through the season. We started with 200 stocks of bees and we finished with 212, and we took 25,000 pounds of honey. 10,000 pounds was comb honey.

Mr. WALTON: You did very well.

Mr. HALL: It was that method, and it meant a lot of work; but we sacrificed our young queens.

Mr. HEISE: I think I remember of hearing someone relate how he handled swarms so as not to increase the number. When the season closed he hived swarms that issued in the hive that had previously cast a swarm throughout the season.

Mr. HALL: We have practised that to our detriment.

Q. What is the easiest method of managing out-yards in regard to controlling swarming?

Mr. HALL: You will have to get a better man to answer that than me. I have had out-yards for years; I am not satisfied with any method I have tried.

Mr. MCEVOY: Give us your best method.

Mr. HALL: Is it extracted or comb honey?

Mr. HEISE: Extracted.

Mr. HALL: The best way I have found, when taking extracted honey, is to visit out apiaries once a week and look through the brood nest, and if queen cells are started take away all brood, (making a new colony of the brood), giving room in the supers and they are about safe for another week, but I find it a big job lifting the heavy supers and would like to learn of a better and easier way to accomplish the end sought.

Mr. SIBBALD: I have had some experience, but my experience is, perhaps, exceptional. My bees were all at home for the winter, and in the spring in moving them I moved them just before the season, and I picked out an average lot to take to the out-yard and put on the supers the day after they were taken there. They went into the supers immediately, and the queens were clipped. Friends were there that if one would swarm they would mark the hive, so that when I came out they would say such and such a hive came out yesterday and went back again, and, of course, I would make an examination of that one, and cut out the cells or take away a frame or two, whatever I saw fit, and in that way I managed first-rate, and I was not in the yard very much.

Mr. HALL: But you had a watcher. I had no watcher.

Mr. WALTON: Is it advantageous or desirable to put a queen excluder over the entrance?

Mr. HALL: I have not tried it, and I don't like anything over the entrance of a heavy stock of bees. It makes them warm, and keeps the drones in.

Mr. MILLER: I do not know that I have anything to add to this; it is something I would like to know. But last year I practised a system that worked very well for a time, and I was prepared to follow it, but found later on it would not work; I should like some information. I made an increase from two colonies by shaking the first colony out and placing that brood on the stand of another colony that was about to swarm, and in removing the second colony from the location.

Mr. HALL: How long did that stay without getting the swarming fever again?

Mr. MILLER: Last season they did not trouble me much.

Mr. HALL: My experience is they just last eight days and they swarm again.

Mr. Post : Necessity is the mother of inventions. I used to screen my bees top and bottom as I handled them in carload lots, and I experimented on leaving the bottom board off entirely from, say, June to September, and I have never been troubled with swarms. From 300 colonies I may get four and five, sometimes ten swarms through a season ; but a plan that I would say would be almost sure to keep them from swarming would be as follows : When you put the super on the hive in the spring I would leave the bottom, of course, screened, although there is no bottom board on it ; put the first top story on without a queen excluder, and as they store some honey and put in a little brood I would raise it and put an empty one under, and then put a queen excluder between the brood chamber and first top storey.

Mr. McEvoy : I do not think you will be understood. You say about screening the bottom—how high up ?

Mr. Post : A wire cloth is close on an inch square frame attached by Vandusen clamps to the bottom.

Mr. Darling : That simply takes the place of the surface of the board work ?

Mr. Post : Yes ?

Mr. Hall : That is just what I have done the last two years ; it is location. Mr. Gemmell and myself expected to have the results Mr. Post got by acting that way. It has retarded swarming and kept the bees at work, but it has not prevented swarming.

Mr. Post : This last season was a very good season for swarming. I put out 110 colonies out at Springbrook. There was a man a quarter of a mile from my place who began the season with nine colonies and his increased up to about thirty-three or thirty-four ; I did not have one that offered to swarm.

Mr. Walton : What was the percentage of honey coming in every ten days ?

Mr. Post : I did not have scales with me ; I have scales at a place four miles over, and there it would be from eight to eleven pounds a day—not every day. There is something very strange about that. Some days we would get eight and ten pounds, and some days we would get two pounds, and to all appearance both days the same kind ; there is something about the climatic conditions of the atmosphere that we do not know exactly about. Some days the blossoms will secrete honey more abundantly than others.

Mr. Saunders : I have no regular rule in out-yards.

Mr. McEvoy : How have you checked them ?

Mr. Saunders : As far as I have done it I let them swarm ; I try to be there every day, in the forenoon especially.

Mr. Hall : If you had three apiaries you could not be there as regularly.

A PLEASING EVENT.

The new president, Mr. C. W. Post, took the chair after the retiring president, Mr. Brown, had returned thanks to the Association for the cordial support given him while in office.

Mr. McKnight : This Association has been a success right from the first till now, and that is something creditable to it. There have been men that have done more than Mr. J. B. Hall has done for the Association in purely business work, but I want to tell you that there is not a man belonging to this Association now or who ever did belong to it that had made this Association's meetings so interesting and practical as our friend Hall. (Applause). He has been the life and soul of our gatherings for the last nineteen years. I think it would be a graceful thing to do anything within our power to show our appreciation of the value of his services to this Association. Although he does not say very much outside of this Association he is known all over the continent of America. I would like to move that this Association make J. B. Hall a life member. (Loud Applause). It is our duty to show Mr. Hall some mark of appreciation of the valuable services he has rendered to the bee-keeping interests of this Province. I hope this will not be made a precedent. It would be very little honor if all the old men were to be associated with him. I would like to see Mr. J. B. Hall the one and only life member of this Association during my lifetime.

Mr. Brown : I have very much pleasure in seconding Mr. McKnight's motion ; I can endorse every word he has said with reference to Mr. Hall.

The motion was carried by a rising vote, and the singing of "He's a Jolly Good Fellow," after which Mr. Hall briefly and suitably replied.

Q. Does the meeting think it advisable to encourage the public to keep bees?

Mr. HALL: Yes—No. I would like to encourage all those that have natural tact to keep bees, and are in a locality where it would pay them to keep them, but to indiscriminately advise every one to keep bees for a living will do a great injury to them. We should be very cautious how we encourage people to keep bees. I may be a rather peculiar temperament; I think a bee-keeper, like a fiddler, is born. If a man can look after ten thousand little things and do everything right, and do them at the proper time and in the proper way, and is desirous of keeping bees, and is willing to live in a new country, encourage him.

Q. Is it advisable to give excluders between all supers when working for extracted honey?

Mr. HALL: One word will answer that: Yes. Why? First, by having the queen excluder below you can work as fast as you choose during the extracting season or manipulating your supers, no fear of killing queens, and it makes no difference if you kill a few hundred workers, because there a few thousand coming on every day to take their place. You save fifty per cent of the time during extracting knowing your queen is not there, and there is no danger of killing her. The nature of the queen is to keep to the top of the hive, and it is only the bees filling in to the top above her that drive her down. Finally she comes down to the bottom board; they cramp her so that she cannot lay enough eggs, and consequently they get the swarming fever; and therefore I find it advisable for extracted honey on all occasions to have a queen excluder.

Mr. NEWTON: I asked the question, and it was for friend Holmes' benefit, but he is not here. He said, in his paper, he only used them where he was hiving swarms.

Mr. HALL: Mr. Alpaugh worked for me three years. The second year he worked for me I wanted him to work on shares. One of the three seasons there came two or three cold days, and he picked out twenty hives of bees that had nicely capped honey on the tops; he went to work at one o'clock and quit at six; he had to carry some honey about fifty yards to get it to the extractor. His sister was visiting him at that time, and she had her knitting down with her brother, and she assisted him by shutting down the gate of the extractor when the pail was full. Make a guess how much honey he had. He did big work because the queen was shut off.

Mr. SHAVER: Eight hundred pounds.

Mr, HALL: He took over one thousand lbs. He could not have done it if his queen had been there. He got over fifty pounds per super from them. That is one advantage of having your queen down—you can work with confidence.

Q. Has any one had any experience with Carniolan bees? If so, how do they compare with other races of bees?

Mr. HALL: I am the first man that had a Carniolan bee in Canada. She was eighteen days in the mail bag, and when I received her there were three live bees with her. We looked at her and came to the conclusion that she was not worth much; we got her safely introduced; she lived about six weeks, but during this time we raised some queens from her. I have never had a better lot of bees than the daughters of those queens—never for quantity and quality of honey. Of course we kept them for a couple of years, and we thought we would like to have a change, and we received three importations after that, and they were not worth the powder to blow them away. But I like Carniolan bees mixed with Italians. My bees are that mixture. Of course you cannot control these young ladies. They go out visiting the men, and therefore if I have any other blood it is from accident, not from design.

Mr. CRAIG: What about their swarming propensities?

Mr. HALL: Just as good as others, and no worse.

Mr. SHAVER: Mr. Hall clips the queens; I know of two different apiaries where they have them and they complain terribly.

Mr. POST: My experience has been almost identical with Mr. Hall's, with the exception that I have never had any poor ones. They are the best race of bees I ever handled. This was one of the poorest years we ever had; we secured between three and four tons of buckwheat honey. The whole amount was secured by the Carniolan bees placed promiscuously in the yard along with Italian hybrids. Many of the Italians required

feeding and they were fed with combs taken from the Carniolans. They will beat any bee I ever had in wintering and building up in the spring, and they are no more likely to swarm than any other bee, in my experience, but you will make a mistake if you put them in a small hive, I believe. Give them plenty of room. I believe in a large hive. My hive is equal to about eleven Langstroth frames. Through the fore part of the season till about 15th June, I allow the queen one top storey and the bottom storey—that makes 16 plus 8, equals a capacity of over 19 Langstroth frames. As soon as the queen begins to lay a little above I raise the top storey and place another one under and place the queen excluder below.

Q. Bees intended to be wintered in the cellar this following winter, and are on their summer stands at present with a rim of three inches filled with sawdust on top—would it be better to put them into the cellar right away or leave them until they get another fly ?

Mr. HALL: My answer to that is to put them in to-morrow if it is not freezing, and if it is freezing let them be until they are thawed out, or just get some hot water from the teakettle and pour it around the stands, so that the moving may be done without cracking. Never mind a fly; they have eaten nothing in the last few weeks to want to make them fly. If they are frozen down loosen them somehow without having any cracks. I like to put bees in when they are flying; the clusters are all loose; you will get a few stings, it is true, but very few. We do not break a cluster by putting them in; the cluster is already broken. They form a cluster when they go into the cellar.

Mr. DICKSON: I believe in putting them in early. Mine have been in just about a month now, and, just as Mr. Hall says, there were lots to fly out, as they had not settled down to clustering.

Mr POST: If bees have a rim of sawdust, as represented in the question, even zero weather will not do them any harm. I have about 200 colonies myself now in the same condition; I do not feel at all uneasy about them, although as soon as the weather changes a little warmer I will take them in. The way my stands are built they will never stick.

Mr. DARLING: My bees are not in the cellar yet, and are not packed with sawdust, but I can take them up after settling down by putting them on a pair of sloops or bobs, and I can draw them on a little snow or on the bare ground, and perhaps before I get them to the house they do not know they have been moved, and sometimes they are all quiet when we get them into the cellar, and sometimes they stir about. Mr. Hall advocates loose bottom boards. I raised up those that were loose, and took off a great many that were not loose, and I propped the front of the hive off the bottom board about an inch; I am not bothered with moisture. My bees last year were not put in until somewhere about Christmas. The reason for being behind was on account of sickness. I found my bees last spring came out drier and better on the average than they did for some years.

Mr. SIBBALD: I have not very much experience in wintering outside. I have wintered some for two or three seasons; and I packed them up a couple of weeks ago. I believe they would be better packed earlier, but I had not time to do it.

Mr. SAUNDERS: As far as wintering outside, my hives are packed all summer; the only trouble I have in the fall is putting on the cushions, which I do about the last of September or first of October. I asked this question. In the home yard I am used to wintering in the cellar. After I had left for the west about 1st September they got some honey dew for about a week or so, and I have been too busy to put them in since I came home, and I wanted to know whether it would be advisable to give them a fly on account of the honey dew, or to put them in right away.

Mr. MCEVOY: That is a serious thing. If he puts them in the cellar he will have to bring them out pretty early. Leave them out a little longer, and bring them out earlier, too.

Mr. EVANS: I winter both in the cellar and out of the cellar. I packed outside a couple of weeks ago in sawdust and clamped eight or nine of them in a twelve foot clamp. The sawdust I usually take in in the spring and put in the honey-house, and it is never damp. I can winter in the cellar without any loss whatever, unless from starvation, but I do not think the bees come on as well when they are taken out. I do not usually put them in until the middle of January; I think it is wise to have them out as

long as possible. I take them out as early as possible. My cellar is particularly dry; the room is just opposite the furnace, and I can open the door and heat it, or close the door and cool it off. Instead of propping up the hives I simply have the hives back so that they are a couple of inches behind the bottom board. I do not put any cushions on top—just leave the ordinary quilt without loosing it. I set them round in rows, and they seem to winter all right. The only objection I have to that system is they do not come along in the spring as well as those that winter out-doors. At the same time that is not a fair comparison, because I always put the light bees in the cellar.

Mr. HALL: What time do you set them out in the spring?

Mr. EVANS: Last spring I did not set them out until about 1st of April; the year before about the middle of March.

Mr. HALL: If you have time, put them out on the 1st March.

Mr. NEWTON: I am an out-door winterer, and I fixed mine up about one month ago. Bees that are wintered out-doors should be fixed up just as early as those that go into the cellar, and I think the sooner we get done with them and leave them to their own glory the better. If we keep disturbing them in the fall I think we will not have such good success in wintering. Then, too, I winter in separate cases. I used to winter four in a case, and I think it is a very good idea, and cheaper than the single. I do not like a clamp; but I like either singles or in fours.

Mr. ARMSTRONG: How much packing does Mr. Newton use?

Mr. NEWTON: Four inches on the side and about ten on top.

Mr. ARMSTRONG: Is it necessary for ten inches on top?

Mr. NEWTON: I will not say it is necessary to have ten on top, but I like it?

Mr. MCEVOY: What is that on top composed of:

Mr. NEWTON: Composed of forest leaves; I do not think there is anything to equal forest leaves unless it is cork saw-dust.

Mr. POST: Do you pack them solid?

Mr. NEWTON: I don't make any solid work of it; I just throw them in. I do not think the solid packing is as good as loose packing; the frost goes through solid packing sooner, My packing is composed of wheat straw; sometimes I use a little oat.

Mr. MCEVOY: Have you any other packing than forest leaves, Mr. Newton?

Mr. NEWTON: Yes; I have planer shavings, saw-dust, flax sheaves and cut straw, and I saw one place where they used rough papers torn up and thrown in.

Mr. MILLER: Some think there is nothing like the flax sheaf. We have a flax mill in our village, and if I could not get anything else I would use flax sheaf; but I would sooner go five miles for leaves than twenty-five yards for flax sheaves, because flax itself is of a very cold nature, and it holds the moisture. One thing I find necessary is the space on top of the frame to allow the passage of bees from one frame to another. Never allow your bees to be shut down on the bars of your frames; they cannot get a passage from one frame to another. You can cut holes in your frames, if you like.

A MEMBER: I pack mine all outside, but I never put them in a case. I pack every one of them singly, each by itself, and, as Mr. Newton does, I leave about four inches of space around the hive, and I fill that in with wheat chaff. I have tried clover chaff, but it seems to lay too heavy, and get mouldy.

Mr. MCEVOY: I agree with this gentleman. I like each to stand separate and single.

Mr. SAUNDERS: So far as the top packing is concerned I have had a little experience with different kinds; I have tried planer shavings and leaves, and have had the best results from saw-dust cushions. At first I made the cushions too large. I make my cushions now so that there is an inch space between the inside of the hive and the cushion.

PRODUCTION OF COMB HONEY.

By JOHN NEWTON, THAMESFORD, Ont.

My apiary is run for comb and extracted honey. I usually select the strongest and best colonies for running for comb. As regards the best, if the records of the hive should say that they built braces or burr combs I do not want that colony for comb, as I believe breeding has a great deal to do with that, and comb honey supers with braces across

them are not nice to handle. I would say pinch such a queen. When spring work has been done—clipping queens, giving room to the crowded queens, by scraping honey at the top of frames so that those cells will be replaced with eggs by the queen, levelling up hives, etc.,—and before the honey season opens I see that my comb supers are scraped and filled with sections $4\frac{1}{4}$x$4\frac{1}{4}$x$1\frac{5}{8}$, which are filled full of foundation, running about 12 square feet to the pound, made from the finest wax that can be procured. Separators are used between sections, and a perforated follower or divider at the sides, which gives an extra bee space, which is of great importance for keeping up the necessary heat day and night at the outside of the outside sections. The divider is just made as one of the separators with a cleat nailed on to allow the extra bee space, and filled with 5-16th inch holes. I use a two part super, thus giving the bees room to store their surplus, and at the same time not giving them so much room that they would loath entering them, as they are at times if super is given them to cover the whole of the top of the hive.

Now, having everything ready when the honey season opens, with hives selected which we desire to run for honey comb, and which should be crowded with bees from side to side, and which on drawing back the quilt we see to be filling up with new honey, we place on one of those half supers close down on the rim of the hive to keep it snug and warm. When swarming commences hive swarms on old stand in hives in which have been placed five starters about two inches deep, the rest of the hive being filled with dummies. After swarms have returned, place parent hive alongside of swarm for five days, after removing to new stand, the flying bees of which will go into the swarm and will thus strengthen it up and give us the best hives for comb-honey production. If the swarm is very large, where one or two should go together, supers are at once taken from parent hive and placed on swarm with a perforated metal board between, so that the queen will stay below and make her home there. An average swarm I leave a day or two before putting on supers, and this catches the pollen below and does away with it in sections. If I have placed on perforated metal boards, I remove them as soon as the queen has made her home below, as I find bees do not work so readily in sections if they have to pass through them. During the honey flow the hives need close attention to see if they require more room, or supers reversed from end to centre so as to get the end sections as well filled as the centre ones. We work the tiering-up system, always putting the empty super next to the hive. When supers are finished they are taken from the hive by means of the smoker or bee-escape, and carried to the store-room. When all honey is taken off, the sections are scraped and graded, then packed in no-drip cases holding one dozen sections; then they are ready for the market.

Mr. W. A. Chrysler: No doubt Mr. Newton knows more about comb honey production than I do, but I will endeavor to insert a wedge. I would take your follower out, and in regard to your perforated followers to retain more heat, I think we understood yesterday that a follower has no heat-producing qualities.

Mr. Newton: I did not say to cause more heat; it would keep an evener temperature.

Mr. Chrysler: It has something to do with keeping it warm, no doubt, but probably many of us have not sought the real reason for that being done. The outside combs of a brood chamber, between the outside combs and the hive, contain the coldest air of the hive, and they get the draught from the entrance: and there is a current of air that passes up on the two outsides of the hive, and will pass to the sections if those two spaces are not closed; and this perforated divider will, no doubt, if placed properly, conduct that cool air and draught up past, so that it will enable those combs to be built out better than they would be, and probably built out as well as if in the centre. But I think we can discard those perforated followers and close up those spaces on the two outside frames of the brood chamber, the top of them, and then the necessary air will have to pass through the cluster of the bees, more especially at night, as our comb building is carried on all night long, and in very cold weather the cluster of the bees will somewhat contract and cause those draughts to go up on the outsides of the hive, but I think Mr. Newton recommended dummies and five frames. I do not think it pays. I would rather put the whole of the combs in at one time, because they have plenty of space below, and they will build the brood combs down no faster than the queen wants them: and if you have the full sheets of foundation in the sections they will go up there at once, and they will not build down even so fact as when contracted, especially if you leave

them any time before you put on the super. They have an idea it is pretty warm down there, and they are so close together; and no doubt they will build it down quicker than if the whole were across. With reference to drone comb being built, they build the comb below for the queen as she needs it, and as they have plenty of room there they will not build drone comb, because drone comb is built when they have ideas of swarming, and it is no doubt built more at that time; and if they build ahead of the queen they will have an idea that they are going to be crowded soon, and will build more drone comb. As for supers being placed on the bees, I think there should be good care taken to have them down very tight, so as not to allow any light or air to pass through. Draughts, even though very slight, hinder the building of combs. Try to protect the bees when building comb as much as you can. If you take them out into the air and light they will stop. I would even rather have the supers overlap the body of the hive to thoroughly keep the draughts and light from them.

Mr. DARLING: Mr. Chrysler said that drone comb is built when the bees are affected with the swarming fever. I had a little experience about ten years ago. I think it was seven colonies I thought I would take comb honey from. They were new swarms, and, as some of you know, I used altogether at that time the old Jones hive. I placed the swarm on five to seven frames on starters, put in the perforated metal, gave them the sections behind this perforated metal. Three out of seven, I think, would have been completely ruined for the next season if I had not overhauled them and taken the combs away, and given them some other. There was more drone comb built than worker comb. They were new swarms on starters and not too much room, and they had the sections to work in; they did not build the drone comb very fast. Of course, I know people say old queens will be the cause of more drone comb than young queens; in this case I cannot say as to the age of the queens.

Mr. CHRYSLER: What I meant about the drone comb in contracted hives is that I think you are liable to get as much, if not more.

Mr. NEWTON: I must say, with regard to Mr. Chrysler's remarks, that we do not get anywhere near as much drone comb when contracted as if we left an open space.

Mr. SHAVER: Do you and Mr. Chrysler use the same sized hive? I have an idea that Mr. Newton's five frames are equal to Mr. Chrysler's hive.

Mr. NEWTON: I have worked with a dozen different hives and my experience has been the same in every instance, that contracted hives do not produce as much drone comb.

Mr. SIBBALD: Comb honey is a part of bee keeping that I am very fond of. I have given it quite a bit of thought and study, and I think from the paper that Mr. Newton has read he would be able to produce first-class comb honey. In some things I agree with him, in other things I have a different opinion. He said he used perforated divider on the outside. I would like to ask him why it should be perforated when he wants to retain heat? Why not use unperforated divider at the outside? Then, he uses a half super. Well, I can understand why he would use a half super when he contracts his bees in that way up to the centre of the hive, because they would not fill the outside sections so well. I rather think Mr. Chrysler's idea is right in the matter of full hive; and I would rather have starters, not two inches, but half an inch or quarter of an inch, just sufficient to let the bees start, and instead of clustering in the centre they will cluster across the top, and they will start every one of those little starters. You can spread them out by coaxing them on to these little starters, and when we have them spread all across there we put our super on; and the bees will take readily to the full sheets of foundation, because they have not much below, and they would rather take that than build new combs, and they will spread right up to the very corner of this super in an hour after, and they will go to work at once, for where their treasure is their heart will be, too. As to the drone comb, I think Mr. Chrysler is right about that in my experience, and I would just like to ask Mr. Newton if he has ever tried to hive in a large hive, and putting in all the frames with small starters.

Mr. NEWTON: Yes; before I made foundation for myself I did not want to spend any more money than I could help, and I used to use the narrow starters, and I never had as good results as with a two-inch starter. I would not advise any larger than two inches.

Mr. SIBBALD: Why draw the line at two inches?

Mr. NEWTON: Why draw the line at one quarter? Because that suits you best, and two inches suits me best.

Mr. SIBBALD: And if you take it down two inches, why not take it three inches.

Mr. NEWTON: That is where you are going too far: then you are giving the queen too much space. The bees will start to build, and she is going to have a chance to let them build a lot of drone comb, but with two inches she fills that. I wish I had brought a few combs that have been built on the five-frame process, and I think I could take you to hives in my yard where, looking at five frames, I do not think you could find a patch of drone comb with young queens.

Mr. SIBBALD: In our yards we have old and young queens, and we cannot govern that, and we have to do the best we can with them.

Mr. NEWTON: I have tried what Mr. Chrysler and you suggest with regard to using no dummies, and hiving them on the full size hive, and to me that has never given as good a results as contracting.

Mr. SIBBALD. I disagree with you on that point.

Mr. NEWTON: I discarded my full super and went to work with half supers, and I think it a great deal better than full supers which cover the top of the hive, and I have done away with all my full supers.

Mr. SIBBALD: I find with the work I have to do in the busy season that one super is small enough, and I believe I would rather have a bigger one still if I was going to change again. As to hiving on the old stand and placing the old hive alongside, as Mr. Newton said, I agree with there. He said he left a swarm two days before putting on the super. I think he is pretty nearly right there, although it might not be out of the way to put the super on next day.

Mr. NEWTON: I agree with Mr. Sibbald, because there is so much difference in some hives; some would make their home there in half an hour, and go right straight to work.

M. McEVOY: Would there not be some danger of pollen if you did this right off. With the two days' system you would not run any risks.

Mr. SIBBALD: If they are hived at noon, and you look in at night, if there has only been a little foundation you will find perhaps three inches of comb, and the next day you will be surprised what a lot they have; and the queen does not start to lay right away as rule, and there is room for the honey and for the pollen, and that is why I object to Mr. Newton's plan of two inches of foundation. They draw that out and they get a whole lot more on to that before he puts on his sections. They would have those five or six nearly drawn down to the bottom in two days without a super.

Mr. NEWTON: That has just put me in mind of one thing why I like that two-inch starter better than Mr. Sibbald's way: I can catch the pollen quicker below than he can catch it in his half inch starters, because there is no place whatever to store his after they start to build.

Mr SIBBALD: I can readily understand where they put their pollen, because if you look into a hive you will find the pollen on the comb near the outside, and you contract them so that they have not any outside comb; but if you had ten you would find the pollen off to the outside. I have produced a good deal of comb honey on that plan, and very few sections have been spoiled with pollen—I do not think there have been two dozen in all I have. Mr. Newton takes off the supers with a bee-escape.

Mr. NEWTON: Sometimes; I do not think in the last two years I have used one bee-escape.

Mr SIBBALD: As to packing for market, I believe if every one would take the trouble to pack them up in an attractive shape there would be better prices got for comb honey, and the grocers would not swear so much when they handle them.

Mr. HOLMES: One more point: Mr. Newton tells us in reference to the queen excluder he places it between the hive and the super, and after the queen has got well established below he removes the excluder. We would like to know just what "well established" means as to time.

Mr NEWTON: I would say just about what I said as regards the putting on of the supers—it might be half a day, it might be two days; and I do not think if it is taken off the second day they would ever attempt to enter the section.

Mr. McEvoy: As a fixed rule?

Mr. Newton: We have no fixed rule.

Mr. Hall: When she commences to lay.

Mr. Newton: I was sorry our friend Holmes was not in last night when I brought up the question. I would like to have asked him why he does not use perforated metal in the extracting season between all supers?

Mr. Holmes: Answering that question just on the moment I would say for this reason: My experience has proven to me that the percentage of trouble in that regard without the use of the queen excluder is very small indeed; and, further, I take it that the bees work up and down freer without it, and so long as the queen does not bother us to any great extent we forego the use of them except on the young swarms, and I put in the queen excluder there, and leave it there perhaps a little longer than Mr. Newton does in the production of comb honey.

Mr. Hall: I use queen excluders. The first lot of queen excluders I bought was for eighty stocks of bees. I was so tickled with them that a week after we bought queen excluders for every hive we have, and, let me tell you, I do not want any queen excluder except during the time of swarming, and I do not want it then excepting three days, unless I am too busy to take it off; and we never want any hive for extracted honey of two or three or four storeys high without the excluder to keep the queen below, because in my case more than fifty per cent. go up. My hive is equal to 11 Langstroth frames, 18 inches long and 10 inches deep, and it is not enough for all queens, even without the honey, and, therefore, I do not want to run any risk. I put the queen excluder on. Then, when you are extracting you have no danger of killing queens, and you can work as quick as you like, and if you do kill a few hundred worker bees you do not do any harm. I always use the queen excluder in the extracting hives between the brood chamber and the supers.

Mr. Holmes: I said that the percentage of trouble in that regard was very, very small. I think I would be safe in saying not five per cent.

Mr. Hall: Your location must differ from mine, but with fully fifty per cent. of the queens go up.

Mr. Newton: Mr. Chrysler criticised this paper with respect to the perforated followers being set up on the side of the super; he complains of the draught. The only reason of that is to prevent the draught. It need not to be perforated for that. I use perforated and plain, and I find the plain, if set up on the side, is equally as good as the perforated; but my experience is that if you have a colony that fills up your hive from corner to corner, the bees are going to fill your sections from corner to corner; and if there is an extra space outside your divider, that is filled with bees as well as next to the combs, so that it can be kept just as warm on the outside of the super as in the centre.

Mr. Chrysler: Why not prevent it before it goes there?

Mr. Hall: We do prevent it.

Mr. Sibbald: I think the plain would be just as good.

Mr. Hall: My experience is it is just as good as good as the other, but the space behind it is what you want. The chief object of the half super is to coax the bees up. Then they will work on to 12 more than 28, and when we put on the second super we have to have half-honey boards; then, when they have got nicely to work in one piece we lift this up, and shove this over, and the honey is around where there is no brood, and they will immediately attempt to fill up that cavity in the centre; then we have then full at the corners any way. We do not want a half super after that, but for convenience sake we use them up to 5, 6, 7, 10, 12, 14, as the case may be.

Mr. Darling: What are your half supers made of?

Mr. Hall: $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{1}{16}$th or 1 inch—it makes no difference. My hive is made of inch stuff. I have to use $4\frac{1}{4}$ sections because that is the standard size, and unless I used that size I could not get more sections if we ran short. If we ran short we should lose, perhaps, a large percentarge of our profit, and I had to discard the oblong sections which I used to use.

Mr. Darling: Do you put your sections lengthwise or crosswise?

Mr. Hall: Lengthwise; I prefer to have the back end of my hive to run out rain water.

Mr. SIBBALD : After you put on the first case you say it does not matter about the half case any more ?

Mr. HALL : It is more convenient and quicker to use full, but towards the end of the season these half ones go on again. With the half super, if you think there is going to be any more come in, put on 12 instead of 28, and those 12 are more liable to be filled than the 28 ; but through the main honey harvest they take a little more handling, but we get so much more finished honey that it pays for this extra handling.

Mr. DARLING : When you put one super, do I understand they begin at this end of it ?

Mr. HALL : Yes, sir.

Mr. DARLING : Why not take this super, if you want it filled up, and shove it that way ?

Mr. HALL : Then I would have to have two honey boards.

Mr. SIBBALD : You say they start over the brood nest to build the sections. That is one of the weak points of Mr. Newton's system ; he contracts to the centre, and there must be sections out over the outside of the brood nest.

Mr. HALL : Yes, and he uses dummies, and they can work into those sections.

Mr. SIBBALD : They will not take to them as quickly.

Mr. HALL : Certainly not. I will give you my experience hiving with full hives. We use five starters. I generally put on half-inch or three-quarter inch, because it is easier for me to handle. We have the five starters for the purpose of getting all worker comb built by our bees. In an out-apiary this year we simply shook them off into full hives. I have been through them since, and I am sorry to say there is forty per cent. of drone comb—drone at one end and worker at the other. With my bees it requires five to held them, and they will swarm out in about ten days after they have been hived. One reason why I put them on five frames is to get all worker comb. Another reason is it drives the bees up into the supers.

Mr. SHAVER : What age queens do you use ?

Mr. HALL : I like queens of the previous season, but I do not always get them so. Then, as to bee escapes, I have three dozen and three of them, and I have not enough.

Mr. MCEVOY : I have not enough, and I have that many.

Mr. HALL : I use none for extracted honey. I want bee escapes for comb honey ; except you are pretty quick about it you have a regular shaking.

Mr. SHAVER : What kind of an escape do you use ?

Mr. HALL : The Porter proper.

Mr. BROWN : How many do you find the best number ?

Mr. HALL : One is better than fifty or than three. I put them on in the afternoon, and I go round in the morning and take off my supers and take them to the house. I have a honey house, one for extracting, for the carpenter work, and one for the honey work. I keep my honey in the house, and it is over the furnace room. I have a register, but I never have the job of using the register.

Mr. SIBBALD : Do you ever find at the latter part of the season they will chew the sections ?

Mr. HALL : They will do that if you smoke them. With my east apiary I have a young lady, and when I went there she had sixty pound tins and 18 supers of honey, but she had smoked them pretty well to get on the escape boards, and some of them had bitten the sections. We use bee-escapes not for extracted honey but for comb honey.

Mr. MILLAR : Mr. Newton in his paper said he left the swarm five days. The colony in that case with my management would swarm in a large percentage of cases, and as regards the escapes, I use them ; I would not think of doing without them. The perforated divisions I have not used sufficiently to say anything about. With regard to half supers, Mr. Hall gave us very good reasons for their use. My hives being odd I use ten frames, equal to five Langstroth frames, but I have my brood under the whole super, and I have no use for these half supers. I use the Headdon. I have brood under my whole super surface.

Mr. NEWTON : I thought I was using a very low estimate in mentioning five days, because I did not expect we would have any swarms at that time.

Mr. HALL : I have fifty hives, the same as this gentleman uses, and I have 150 supers on them, and I have the same objections to those supers. I use them because I

have that hive, and those supers fit it. Then, I very often give a half super to a swarm of bees because I do not like to give them another full super of 28 sections. It is the first part of the season and the end of the season where the small supers have the superiority. I have 150 of those very supers, and they are good. I do not use them as the maker intended them to be used. I never take out one uncapped frame and put it in to the centre so that it will be finished, and I never turn it over because my bees fill to bottom better than the top. I never move broad frame which holds four sections, because I have not the time. I fill the thing full of foundation. I guess that was calculated to be used with little bits, and that reversing is intended for that.

Mr. HEISE: I conducted an experiment some two years ago. I had a board something after that style (shows), and there was an escape at each of those points, 8 or 9 all facing the one way. I had then a Porter back of that three inches, and then a double lightning escape, making in all 13 escapes. I piled up about five supers, and put the escape board on top. The bees started to rush out of the super at the side, and 90 per cent. came out of that one space.

Mr. HALL: They come out where the sun is.

Mr. CRAIG: There has been a great deal said about escapes. I do not want to say anything one way or the other, only in our own experience while we have an abundance of escapes we have used carbolic cloth instead of smoke: a small quantity of carbolic acid added to a quantity of water, and put on cotton cloth. There is no danger of any taint. We spread that carbolized cloth over the super when it is on the hive, before we take it off?

Mr. BROWN: How long should it be on before it is time to take it off?

Mr. CRAIG: Just a few seconds.

Mr. HALL: I put these things on in the afternoon, and I do not like to work in the sun, and so in the morning I get around with the wheel-barrow and wheel load after load into my room and I take off my escapes at my convenience. They may be on a day or two before they come off.

Mr. ARMSTRONG: I wish those who do not use queen excluders would say how they rid their supers of bees without the bee-escapes.

Mr. NEWTON: I give them a good blast of smoke, and grab up the sections and give them a right good shaking, and soon get rid of the bees; and I never notice any cappings bit in any way. A great many people use different things in their smoker. I think there is nothing to equal planer shavings when we want a right down good smoke for a short while.

Mr. CHRYSLER: There would be a little danger with some bee-keepers in using too much smoke, without a warning, and have the honey tainted. With proper judgment there would not be much danger in that line, unless it might be smoke from certain kinds of fuel.

Mr. NEWTON: Every bee-keeper will have to use his own judgment.

Mr. SHAVER: As soon as the bees go down stop.

Mr. DICKSON: In smoking I have used a great many things, and I must admit the shavings are the best.

Mr. HALL: Have you tried cedar bark, thoroughly dry?

Mr. DICKSON: Yes, and it is too hot.

Mr. SIBBALD: With regard to Mr. Armstrong's question I may say I use very little smoke. As soon as the cover is taken off the bees will face you, and I smoke just to let the smoke touch the bees and they will turn around and run the other way, and then you can take the sections off. My method of shaking them is as follows: I lay a three corner stick on the ground, and take the super in both hands on the outside with the ends of the sections down and just tap gently until they start to run; and then when you get them running pretty well, a few shakes will shake them all off. In the middle of the season I have taken off 500 sections in about an hour, and had them all loaded on my waggon. There is one thing I ought to mention: when the honey is very warm in the afternoon, if you hit too hard you may break the sections. I had one case where there were three or four in the centre broken. I know what did it, and I know how to avoid it.

Mr. MCEVOY: At the close o the season supposing they were a little bit apt to rob?

Mr. SIBBALD: You do your work so quick, and when you are shaking them they cannot catch on, and when you get them out you take it away.

Mr. NEWTON: I never turn the point of my smoker down among my sections; I always turn it straight so that the smoke goes above. If it went down it would be apt to taint the sections.

Mr. McEVOY: Take an ordinary man, and he drives them down with a great smoking, and those bees are going to have revenge, and they set to work and chip the capping.

Mr. NEWTON: As regards escapes, I had one case that sickened me of them; it might have been my fault; my escapes got clogged, and I think I had four nice supers which I did not go back to until the next morning and they were not worth much.

Mr. BROWN: That has been my experience with the escape. I have used only one, and my experience has been like that.

Mr. SHAVER: I am like Mr. Newton; I have one, and that is one too many.

Mr. NEWTON: There has been a great deal of discussion on the American side about bee-escapes, and I find there are a great many who have discarded them on the ground that they spoiled so many sections. One reason is that it is not put on at the right time, and another, it is apt to get clogged. Very often we don't know that our escapes are clogged.

Mr. HALL: I may say I suppose I have taken 22,000 pounds of comb honey, and I have had one super spoiled, and I could afford that because it saves me so much work other ways. I had one super spoiled simply because there were some drones in it.

Mr. POST: I use two dozen Porter bee escapes, and I cannot tell you were they were manufactured, but they are a success with me. In the closing of the season I double up and put two supers on each bee-escape, and carry them from different hives. I put them on one day and go the next morning and take them off.

Mr. McEVOY: The way it is going now we are all at sixs and sevens.

Mr. CHRYSLER: If the bee escape was taken away from me it would not worry me very much; I could easily find another method of doing it. A person may get into his own way of doing things, and I do not think it should be set down that there has got to be a bee-escape, or a Porter escape, or any other method.

Mr. HALL: I have had imitations of the Porter bee-escape, and the springs were too strong.

Mr. POST: If we cannot agree upon this we had better drop it and leave it to each to do as he chooses.

A MEMBER: Can drone bees pass through the escapes?

Mr. HALL: The one case of failure was blocked up by drones. They cannot pass through them.

Mr. McEVOY: If they are liable to get clogged it is well to look after that.

Q. Bees going out at entrance at hive hang around on entrance board, as if chilled with cold and wings all in a quiver—what is the cause?

Mr. PICKETT: I have not had a case of this kind and cannot answer. I presume it must mean paralysis. There is one thing lacking; it does not say at what season of the year.

Mr. DICKSON: I asked the question, and I would like an answer to it. It was in the month of May. Two good colonies of bees had come out on the entrance, and just acted as if they were put out too early, and were all in a flutter.

Mr. HALL: Were they dark-colored—shiny?

Mr. DICKSON: No; there was nothing special in their looks; they did not seem to live long. Each morning I would sweep away the entrance board and there would be possibly half a dozen or two dozen the next morning; and when it was warm it seemed to effect them in the same way. I examined the hive and everything seemed all right; one of them was about holding its own, and the other was gaining, and I was determined to make short work, and we finished the hive. I would like to know what was the cause.

Mr. HEISE: How long did that continue?

Mr. DICKSON: It must have been three weeks any way from when I first noticed it.

Mr. PICKETT: Did any of them wander away that you know of?

Mr. DICKSON: I could not say.

Mr. McKNIGHT: The answer to that question may be paralysis. I have read about it. Is there any such disease known as bee paralysis?

Mr. HALL: I have some in my cellar that will have it in the spring. They call it

bee paralysis, and what it is I do not know, and when they get the good honey it seems to cease ; but keep them till next season and it will appear in those colonies again.

Mr. Post : Would re-queening have any effect ?

Mr. McEvoy : That is certainly the cure.

Mr. Armstrong : Did you ever remove the queen and find that it disappeared ?

Mr. Hall : Yes.

Mr. McEvoy : I have had that experience.

Mr. McKnight : What are the symptoms of bee paralysis ?

Mr. Hall : Those are they—the bees quivering and running around.

Mr. McKnight : Have you any idea of the cause ?

Mr. Hall : No.

Mr. Chrysler : I heard one man say that he cured it with salt, but I have not very much faith in his ideas.

A Member : Might not this paralysis you are speaking of be caused by getting poison ?

Mr. Hall : Poisoned bees run away from the hive.

Mr. Sibbald : I have had a case of poisoning, and a case of what I thought was bee-paralysis, and there is a difference. In poisoning they go out and seem bloated and swollen, and they lie out in numbers in front of the hive in the grass and live there for perhaps a day. With this paralysis they do not seem bloated, and they come out and go back in again, and some would die on the front board.

Mr. Hall : In other words they do not want to leave home.

Mr. Sibbald : And the cure that has been mentioned, the changing of the queen seems to do away with it at once.

Mr. Dickson : In this case it certainly was not poison, because they would run in and come out. There was one I was really sorry to destroy.

Mr. McKnight : I think this disease known as bee paralysis is just as somebody suggested, poisoned bees, and I think that arises from spraying of fruit trees when it is illegal and when it is legal. I believe the spraying of fruit trees is a great detriment to bee-keepers, even when it is carried out in accordance with the law. The law simply prevents people from spraying trees during bloom time. A large proportion of the poison goes upon the foliage of the tree, and the bees need water, and they will gather it anywhere, and I have seen them sipping up the dew from the foliage of these trees where the poison has been dropped. I have seen bees curled up dead upon potato vines, and my opinion is that whether spraying is done in fruit bloom or after, it is still an injury to bee-keepers.

Mr. Hall : My observations with poisoned bees is that ninety-five per cent. of them are bees that have never flown from the hive, and I believe they are poisoned by the worker bees that bring it home. But with regard to these bees that have bee paralysis, as it is called, the hives will have it the next season as well as this seasen. These bees want to get into the hive, and the poisoned bees want to get away.

Mr. Darling : I think Mr. McKnight is right in his statement with regard to poisoning after the bloom has gone . In my section there is not much trouble with spraying, and I have had it before there is spraying done.

Mr. Brown : There is very little spraying done in our immediate section, and I have seen bees acting as Mr. Dickson described, and I cannot put it down to spraying ; but I am satisfied that where spraying is done extensively the poison on the foliage will poison the bees.

Mr. Evans : I think the danger in spraying leaves and trees when not in bloom is very slight. Just across the fence from my place is an orchard which was sprayed, and the matter sprayed remained on the leaves a long time, but I found no evil results. I do not think any statement should go out that bees are injured by spraying except when trees are in bloom, and I think we ought to hold the restriction we have now.

Mr. McKnight : Was bee paralysis ever known or spoken of till tree spraying began ?

Mr. Post : Yes. I have had cases of so-called bee paralysis about fifteen years ago, and I do not know whether there was spraying done before that date or not.

Mr. Armstrong : I have had it and I laid it down to the queen, and I have killed the queen and it disappeared.

Q. Will honey weighing 12 lbs. to the gallon be improved by exposure in tanks or cans ?

Mr. PICKETT: No, and the reason is you lose the aroma or volatile oil to a large degree when exposed any length of time, and I consider you lose really the essence of the honey.

Mr. SHAVER: You can improve it in body, can you not?

Mr. PICKETT: Not much.

Mr. MCKNIGHT: I think that is a ridiculous question. But it altogether depends upon the character of the vessel in which it is put and the conditions of the atmosphere whether it improves or deteriorates. There is one thing certain, that if you put honey into an open vessel and keep it there for a certain length of time it will lose its aroma whether it improves in body or fails. The essential oil which gives the honey the aroma is a volatile oil and will pass off if it gets a chance, and it will get a chance in any open vessel; and therefore it will deteriorate so far as losing its aroma is concerned. As to its body, that depends much upon temperature, the condition of the atmosphere and the season of the year.

Mr. HALL: But the beautiful part of the honey is the aroma, and if you cork it up as soon as you take it, you will retain that.

Q. Which is the best, the ordinary make foundation or the Weed maker?

Mr. PICKETT: I have not used the Weed, but if what is claimed for it is true, that it is softer than the ordinary foundation, and strong enough to bear the bees without sagging, I suppose it would be an improvement.

Mr. MILLER: I think it is possible that it may be softer and it may be possible that it will not sag, but I do not consider that is what is wanted. The idea is, will the bee handle it sooner and better, and use it for what he needs it? I have not tested it, but I understand in the Weed the grain of the wax is crushed and it has no longer any granules to be worked by the bee. I think the bee in drawing out comb will pick it out in granules and build comb that way. In building natural comb he uses wax pockets, and it is worked in those granules, and I think the bees prefer to work it that way instead of working something that will pull out like strings. I do not doubt but that the bees will work on the Weed foundation all right, but I think they prefer to work on the foundation and use their own wax.

Q. What is the best method of getting rid of pollen?

Mr. PICKETT: The way I get rid of it, if I have too much of it, I destroy the comb. I would be pleased to hear from some others in that line.

Mr. HALL: That question has been pretty well answered in discussion on Mr. Newton's paper—by giving them room in the hive to put in.

Mr. NEWTON: I think there are a couple of gentlemen here who have misunderstood Mr. Hall in one thought, and I think he should have a moment to explain himself. It is about leaving perforated metal between the comb supers and the hive—does he do it or does he not do it?

Mr. HALL: We use the perforated metal only for comb honey at the time of hiving a swarm, and only on contracted hive, and we do not go back to take it off until it is convenient. Any hive in the yard that has not swarmed has no excluder. I want the excluders only for extracting, so that we may work quickly.

Mr. SHAVER: Do you not get a little better honey with the queen excluders than without?

Mr. HALL: No. Some days we get an abundance of pollen in our sections, and some years we take a very large crop of comb honey. Some years, I may say, out of perhaps four or five thousand pounds we may have twenty sections with pollen in. Other years the hives and swarms, treated just the same, we would have 200 or 300 sections with pollen in. What the reason is, I do not know. There are some races of bees that do not know much, and do not know where to put the pollen.

Mr. MCKNIGHT: The excluder is used to prevent the queen from going up and depositing eggs above and detroying comb honey; is that likely to occur if contraction is not practised?

Mr. HALL: Yes, sir.

Mr. MCKNIGHT: Not often in my experience.

Mr. HALL: I did not say how often; there are some very stupid bees that do not know where to put the pollen. I got some bees a few years ago; they were grand bees to handle and build comb as long as they could do it at home, and they were very pro-

lific. But they did not know their own home, and you can find them in every hive in the yard. They do not know enough to sting or to put the pollen in the right place. They were the stupidest bees I ever had, and the prettiest I had.

APPOINTMENT OF INSPECTOR OF HONEY FOR PARIS EXPOSITION.

The meeting felt it would be desirable to recommend to the Government a fit and proper person to inspect the samples in the Canadian honey exhibit before shipment to Paris, and it was moved by Mr. COUSE seconded by Mr. MCEVOY,

"That this Association recommend to the Government Mr. C. W. POST for the position of Inspector of the honey exhibit going to Paris."

The motion was carried.

The Association decided to make no recommendation with regard to the appointment of a person to accompany the exhibit to Paris.

THE BEE JOURNAL.

The question of the Bee-keepers' Association taking over the Canadian Bee Journal was discussed, but the opinion of the meeting was that the Association was not in a position to undertake the management of the Journal.

Mr. DARLING moved and Mr. EVANS seconded, "That this Association recommends to the Board of Directors that for another year we give the Canadian Bee Journal to the members on the same terms as in the past." Carried.

On motion of Mr. MCEVOY, seconded by Mr. SHAVER, the meeting adjourned.

DIRECTORS' MEETING.

At the Directors' meeting following the annual meeting, the following business was transacted:

Mr. W. COUSE was re-appointed secretary and Mr. EMIGH, treasurer. The sum of $200 was appropriated to affiliated societies, but no society was to receive more than $20. There was a grant of $25.00, $10.00, and $10.00 made to the Toronto Industrial Exhibition Association, the Western Fair Association of London, and the Canada Central Exhibition Association of Ottawa, respectively.

The President, Vice-President and the second Vice-President were appointed an Executive Committee.

It was decided that the Canadian Bee journal would be given as a premium to the members of the current year.

Mr. DARLING and Mr. POST were appointed a committee to send samples of honey to Professor Shutt of the Experimental Farm at Ottawa, to ascertain the percentage of water in the different samples.

BY-LAWS.

1. This Association shall be known as the Ontario Bee-keepers' Association, and shall be composed of those interested in bee-keeping who become enrolled as members by paying the annual membership fee of one dollar.

2. A general meeting of the members of this Association shall be held once a year, and shall be known as the Annual Meeting, the year to begin with the election of officers at such Annual Meeting and terminate on the election of their successors at the next Annual Meeting. At this Annual Meeting, or at any other general meeting of the members of this Association, ten members in good standing shall constitute a quorum.

3. The time and place of holding the next Annual Meeting shall be fixed by the members present at the Annual Meeting,

4. The Board of Management shall consist of a President, two Vice-Presidents and nine Directors elected one from each of the following twelve divisions :—

Division No. 1.—Stormont, Dundas, Glengarry, Prescott and Cornwall.

Division No. 2.—Lanark, Renfrew, Carleton, Russell and Ottawa.

Division No. 3.—Frontenac, Kingston, Leeds, Grenville and Brockville.

Division No. 4.—Hastings, Addington, Lennox and Prince Edward.

Division No. 5.—Durham, Northumberland, Peterborough, Victoria and Haliburton.

Division No. 6.—York, Ontario, Peel, Cardwell and Toronto.

Division No. 7.—Wellington, Waterloo, Wentworth, Dufferin, Halton and Hamilton.

Division No. 8.—Lincoln, Niagara, Welland, Haldimand and Monck.

Division No. 9.—Elgin, Brant, Oxford and Norfolk.

Division No. 10.—Huron. Bruce, Grey and Perth.

Division No. 11.—Essex, Kent, Lambton, Middlesex and London.

Division No. 12.—Algoma, Simcoe, Muskoka, Parry Sound, Nipissing and Manitoulin.

Also one Director from the Ontario Agricultural College and Experimental Farm. The Board of Management so elected shall appoint from among themselves, or otherwise, a Secretary and a Treasurer, and shall also appoint at least three of their number as an Executive Committee.

5. Five members of the Board shall constitute a quorum.

6. Vacancies on the Board by death or resignation may be filled by the President, subject to the approval of the Executive Committee.

7. The officers of this Association shall be elected by ballot, with the exception of the Auditor, who may be elected by an open vote of the Association.

8. It shall be the duty of the President to preside at all meetings of this Association; to call for reports; to put motions when seconded; to decide upon questions of order and to declare the result of ballots and elections. The President in connection with the Secretary, shall have power to call special meetings when necessary. The President shall be *ex officio* chairman of the Board of Directors, and shall call it together when necessary.

9. In the event of the death or absence of the President, the Vice-President shall discharge his duties.

10. It shall be the duty of the Secretary to keep and preserve the books of the Association; to call the roll and read the minutes at every meeting of the Association; to conduct all correspondence of the Association; to receive and transfer all moneys received for fees and otherwise to the Treasurer, having taken a receipt for the same; to make out a statistical report for the Association and for the Government; to furnish the officers of the County and District Associations with forms for organization and annual reports, and to give notice of Association and Board meetings through the press or otherwise.

11. It shall be the duty of the Treasurer to furnish such securities for the moneys of the Association as the Board may determine; to receive from the Secretary all moneys belonging to the Association and to give receipts for the same; to pay them out on order endorsed by the President and Secretary, and to render a written report of all receipts and disbursements at each Annual Meeting.

12. Any County or District Bee-Keepers' Association in the Province of Ontario may become affiliated to this Association on payment of five dollars, which shall be paid to the Secretary on or before the first day of June in each year; but every local Association so affiliated must have on its membership roll at least five members who are also members of the Ontario Bee-Keepers' Association at the time of its affiliation, and must continue to have a like number of its members on the roll of this Association while it remains in affiliation.

13. Every affiliated Association shall receive an annual grant out of the funds of this Association. The amount of such grant shall be fixed by the Board from year to year.

14. All grants to affiliated Associations shall be expended in prizes for honey shows, or for shows of apiarian appliances, or for lectures on subjects pertaining to bee culture, or for advertising district or county meetings, or for any or all of these, and for no other purpose.

15. Every affiliated Association shall report to the Secretary of this Association (on a form to be supplied by the Secretary) before the first day of December in each year, which report shall be signed by the President and Secretary of the affiliated Association.

16. County or District Associations seeking affiliation should forward to the Secretary an application according to the following form:—"We, whose names are written in the accompanying form, having organized ourselves into a County (or District) Association to be known as County (or District) Association No. —, desire to become affiliated to the Ontario Bee-Keepers' Association, and we agree to conform to the Constitution and By-Laws of said Association."

Form of application as follows:—

Names of those already Members of O. B. K. A.	P.O. Address	Fees.	Names of those not already Members of O. B. K. A.	P.O. Address	Fees.	Remarks.

17. Every affiliated Association that neglects or refuses to pay the annual affiliation fee, or neglects or refuses to forward to the Secretary the annual report on or before the date fixed, may be deprived of their affiliation privileges by the Board.

18. Should an affiliated Association become defunct after the payment to it of the grant from this Association, any unexpended balance of said grant shall be forfeited and paid over to the Treasurer of this Association.

19. Each affiliated Association shall be entitled to the privilege of two representatives at the meetings of this Association in addition to those who are already members of this Association, and such representatives shall be entitled to all the rights and privileges of members of this Association.

20. Every delegate from an affiliated Association shall furnish to this Association a certificate, signed by the President and Secretary of the body which he represents, showing that he has been duly appointed a delegate of such Society.

21. Each affiliated Association shall be entitled to the services of an Association lecturer (when such exists) once in each year, half the expenses connected with such lecture to be borne by the District or County Association and half by this Association.

22. The order of business by which the meetings of this Association shall be governed shall be in the discretion of the President, but subject to appeal to the meeting when objection is taken, when a majority vote of the members present shall decide on the objection, and in such cases the vote of the majority shall be final.

23. These By-Laws may be amended by a majority vote of the members present at any Annual Meeting, or at a special meeting of the members called for the purpose of considering the same, and of which at least two weeks' notice shall be given by public advertisement.

APPENDIX A.

EXPERIMENTS IN APICULTURE.

I regret to say that the past season has been one of the poorest the bee-keepers of Ontario have had for many years. All over the Province of Ontario the winter of 1898-99 was unusually severe. Not only was the temperature low at different times, but in several instances the low temperature prevailed for a considerable period of time. I looked for great mortality among bees, especially those wintered outside, and when spring reports came in these expectations were only too fully realized. Judging from general reports, I believe that during the winter mentioned there has been the heaviest loss in bees experienced for at least eighteen years.

In addition to the above, the summer of 1899 will long be remembered by bee-keepers as opening up with fairest promises for those bees which wintered. All the conditions appeared to be very favorable to the secretion of nectar, and the careful bee-keeper made every preparation for a large honey crop.

Clover came in blossom and day after day passed without the bees doing much on it. Dry weather followed a prolonged season of favorable weather without either giving a honey harvest. The thistle and linden bloom passed, and nearly all bee-keepers in Ontario had disappointment instead of a honey crop.

In connection with the shortage of honey, it may be well to mention that the above report in connection with the mortality in bees and the shortage of the honey crop holds good for the districts throughout Canada where bee-keeping is carried on extensively, and the shortage in the honey crop was equally marked in the United States.

Summing up the above report, we find the following :

1st. The winter of 1898-99 resulted in a largely decreased number of colonies of bees in Ontario to begin the summer of 1899.

2nd. An unfavorable honey season during the summer of 1899, with little swarming and increase of colonies. Other colonies did not gather enough honey to provide the bees with sufficient stores to carry them through the present winter. In many cases careless and discouraged bee-keepers did not go to the expense necessary to provide food for these bees, which will mean the loss of such.

3rd. The shortage in the honey crop of 1899 will leave the market very bare of honey, and it has increased the wholesale and retail price of honey.

This being the case, those bringing their bees safely through the winter should give them every care and attention tending to put them in the most favorable condition for gathering a large honey crop, and whatever honey may be secured should be marketed at good prices.

While entailing a heavy loss in outside wintering the exceptional winter has made our experiments of greater value. Just as the chain is strong only as it is so at the weakest link so it is in the wintering of bees.

The aim and object of the bee-keeper should be to so prepare his bees that he can look forward to their successful wintering with a reasonable degree of certainty. It should not be satisfactory to have the assurance that they will winter through an average season, but we must and can prepare them that they will winter with just as great a certainty as any other stock upon the farm.

In the experiments in wintering bees which we have conducted we have divided them into two leading heads.

Cellar Wintering and Wintering on Summer Stands.

We have had distinct and new features introduced in our experiments in connection with cellar wintering, and these cannot be brought too prominently before the bee keepers of the Province, and in fact any country in which similar winters prevail and in which bee-keeping is a department of agriculture.

The system adopted by us in our experiments is artificial heat ; and, in connection therewith, the drawing out of the cellar impure air and replacing it with air from outside, warmed before reaching the bees.

The first cellar in which this experiment was carried on is constructed as seen in Fig. I.

It is a combination of five cellars, or rather a large stone cellar divided into five parts, four of which were used for the bees, and these repositories communicated with one another by means of doors and also by means of openings in the dividing walls, fourteen inches square near the top of the wall, and through the same openings a six inch stovepipe ran. These openings allowed a circulation of air from one room to another, as seen in Fig. I. A stove was placed near the cellar door, which communicated with the

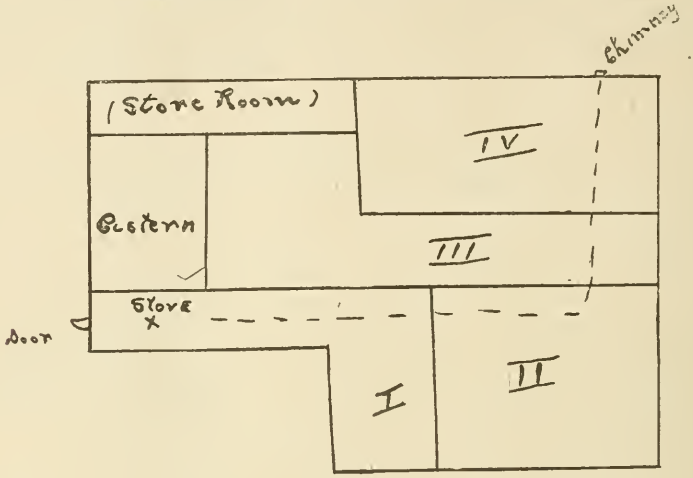


Fig. I.

outside ; and through this door the fresh air from the outside had access. The air in its natural course, by means of the openings around the stovepipe, passed from room to room ; and finally in the fourth room passed out by means of a similar opening in the chimney—the same chimney into which the stovepipe entered. This chimney has in addition a pipe entering it from the stove used in the living room above. Coal was used after finding wood unsatisfactory. During $3\frac{1}{2}$ months, using 2,550 lbs. of stove coal, the temperature kept in No. 1 and 4 was 46° ; in No. 2 and 3, 45°. The objection to having the air pass from one repository to another was found to be that as it passed from one to another it became more and more impure ; however, the results were very satisfactory and much superior to the best known previous methods.

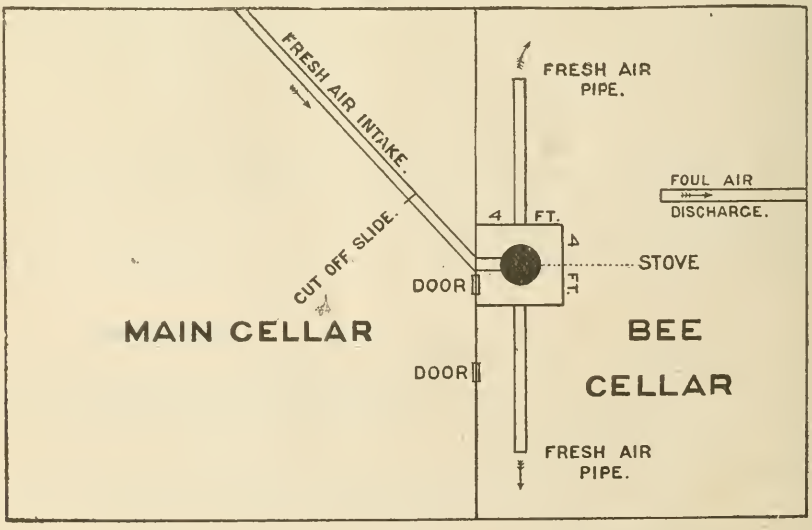


Fig. II.

A more perfect system was then adopted as in Fig. II.

This is a plan which can be adopted by almost any person having an ordinary good sized cellar ; and after carefully testing this system I know of no better, economy, convenience and results taken into consideration. It would pay any one with forty or even a less number of colonies to winter.

The stove here used was not a self-feeder—a decided advantage—requiring less care and giving a more even temperature.

For 100 colonies the fresh air pipe should be 14 in. in diameter with a cut-off slide as a regulator. The foul air pipe may be allowed to discharge through the cellar window into the open air, but a better plan is to connect it with a chimney ; one having a pipe coming from a fire would be preferable. The plan just given is the one I would strongly recommend to bee-keepers.

Outside Wintering With Protection.

Of the various experiments in outside wintering the following has proved the most satisfactory.

Outer cases were contsructed of $\frac{3}{8}$ inch stuff and painted a dark color, to contain four colonies, two to stand side by side and the pairs back to back, as in Fig. III., with room

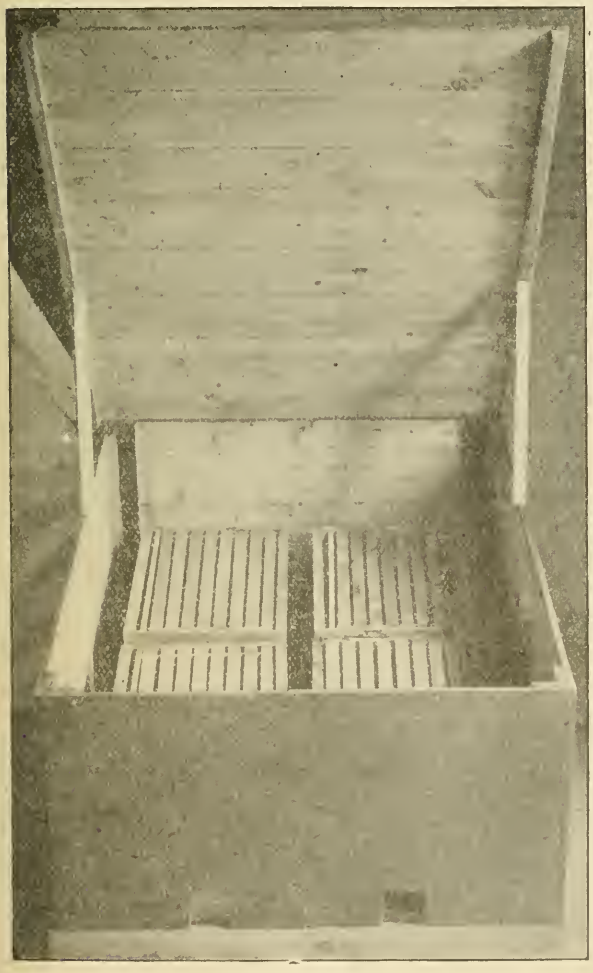


Fig. III.

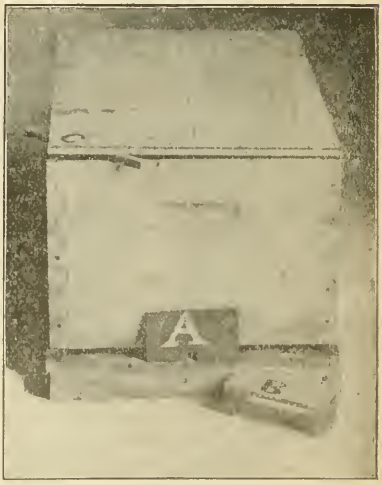


Fig. IV.

for two inches of packing between the hives and the outer case sides, and one inch between the hive sides and backs. At the bottom, sufficient room was made for half an inch of

packing at the front, and a little over an inch at the back, thus giving the hive, when packed, a slightly forward pitch.

The entrances run the full width of the hive, 12½ inches. To prevent the front from completely closing the entrance, the plan indicated in Fig. IV. was adopted.

On the alighting board was placed a bridge six inches long (Fig. IV) the width of the alighting board; under the board and at the end underneath was nailed a piece ⅞ inches square and the length of the board width. When this bridge is placed on the alighting board and the hive packed, it offers underneath a passage for the bees to go in and out on the alighting board and underneath the packing alone. Another important point is a piece of cardboard (a. Fig. IV) six inches wide, an inch and a little more in depth in the centre of the lower edge; a passage one-half inch square is cut in the cardboard. The cardboard is put between the front of the hive and the bridge. When packing, the pasteboard is kept just above the entrance to the hive; this leaves the board projecting ⅜ inch below the bridge. The ⅜ inch projection is a matter of great importance. The bees should be packed before cold nights become frequent, say October 1st, and yet it is not advisable at that time to contract the entrance to ½ inch wide; for this reason the cardboard is kept above the entrance. It is allowed to project ⅜ inch below the bottom of the bridge board to allow the bee-keeper, when settled cold weather comes, to pass a long-bladed knife or sharp tool in at the entrance of the outer case and with this draw the cardboard down to the bottom board, thus leaving the entrance to the hive only ½ inch wide and deep. This should be done about December 1st or when winter appears to be setting in. The outer covers were removed from the hives; where quilts were used they were loosened, and a block put under the rear corner; for the purpose of illustration the block is put under the front corner in Fig. IV. *c.*, leaving an opening for the air to pass upward from the hive. In about half the number of colonies honey boards ⅜ inch thick were used instead of quilts; they were loosened and a similar block put under one corner. This, too, allows the air to pass upward through the hive. Dry leaves are now packed loosely about the hives, and ten to twelve inches on top, the last five or six inches of top packing being put in about the time that the entrance was contracted. Planer shavings and dry forest leaves were used. I prefer dry forest leaves, especially maple and oak leaves. When the cardboard had been drawn into place at the entrance, a board ten or twelve inches wide was placed in a slanting position against the outer case, protecting from wind, sunlight and snow the entrance in the wintering case.

The loss during the severe winter of 1898-99 was heavy, compared with cellar wintering.

In No. II. apiary the winter and spring loss, May 24th, 1899, stood as follows:

	Alive.	Dead.		Alive.	Dead.
Clamp No. 1	3	1	Clamp No. 11	4	0
" " 2	1	3	" " 12	2	2
" " 3	3	1	" " 13	4	0
" " 4	2	2	" " 14	3	1
" " 5	3	1	" " 15	4	0
" " 6	3	1	" " 16	4	0
" " 7	2	1	" " 17	4	0
" " 8	1	3	" " 18	4	0
" " 9	1	0		—	—
" " 10	3	1		51	17

In No. III· apiary :—

	Alive.	Dead.		Alive.	Dead.
No. 1	3	1	No. 7	3	1
" 2	2	2	" 8	4	0
" 3	3	1	" 9	3	1
" 4	4	0	" 10	0	4*
" 5	4	0	" 11	4	0
" 6	3	1	" 12	4	0

*In clamps Nos. 10 and 14 the top packing had been left out, and, in all probability, during the prolonged seasons of low temperatures, the bees literally starved to death in the midst of plenty, after having consumed the stores upon which they clustered.

	Alive.	Dead.
No. 13	3	1
" 14	1	3*
" 15	3	1
" 16	3	1
" 17	4	0
" 18	4	0
No. 19	3	1
" 20	4	0
" 21	1	3
" 22	3	1
	66	22

*In clamps Nos. 10 and 14 the top packing had been left out, and, in all probablility, during the prolonged seasons of low temperatures, the bees literally starved to death in the midst of plenty, after having consumed the stores upon which they clustered.

Outside Wintering Without Side and Bottom Packing.

We have had, until last winter, four years of unbroken success in wintering a hive of bees having the brood chamber in two parts, the first set of frames, ten in number, measuring $14\frac{3}{4} \times 8\frac{1}{2}$ inches, and the upper ten $14\frac{3}{4} \times 4\frac{1}{2}$ inches. As before, the only protection offered was about five inches of packing in a super above the frames. The bees perished. See Fig. V. and Fig. VI. for difference between this hive and the ordinary hive. The great difference is that the bees can communicate through the centre of the cluster in Fig VI., and Fig. V. only through the outside, but even this will not answer in a locality where the temperature remains for a considerable length of time as low as 20° below zero.

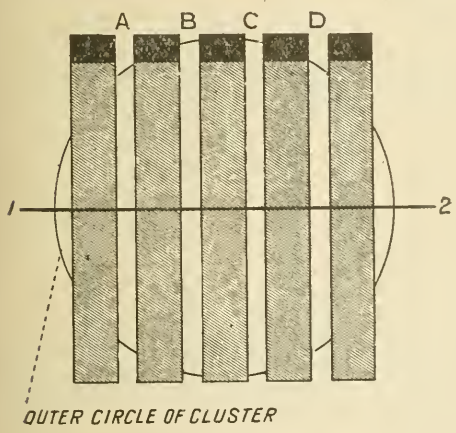


Fig. V.

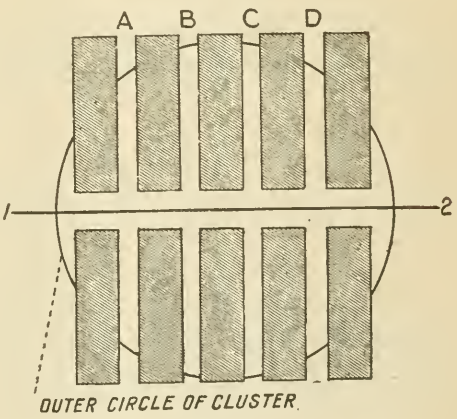


Fig. VI.

With migratory bee-keeping on the increase, a rapid method of preparing the bees for shipment is desirable. Last year's experiments in moving bees with a portico at the entrance was repeated with entire success. The bees were, as during the previous season, moved to fall pasture with the portico entrances attached to the fronts of the hives, and with the same success. In addition, having orders for bees in various parts of the Dominion, including British Columbia and Prince Edward Island, sixty-five colonies were prepared and shipped in the above way, and in every case the bees reached their destination in safety—a very severe test.

Comb and Extracted Honey.

On account of the failure in the honey crop no results of any value could be obtained in connection with the production of comb and extracted honey.

Stores Consumed by Bees in Autumn.

Twenty colonies were weighed on Oct. 9th, and again Nov. 5th, to acertain the loss in weight before putting in the cellar. The weights on No. 69 and No. 30 were lost—they are therefore not taken into account. The results were as follows:

	Oct. 9th.	Nov. 5th.	Loss.
No. 36	47	44½	2½
" 71	41	40	1
" 34	41	40	1
" 32	43	42½	½
" 69	weight lost	47	
" 67	45½	42½	3
" 30	45	43	2
" 28	50	46½	3½
" 65	50	48½	1½
" 63	46	43	3
" 15	51½	50½	1
" 17	50	47	3
" 19	44	40½	3½
" 21	47½	45	2½
" 25	39	36	3
" 27	42½	41	1½
" 27½	41	38	3
" 29	42½	38½	4
" 30	weight lost	40	
" 31	41½	39	2½

Eighteen colonies lost 42 pounds. Greatest loss of any colony, 4 pounds; the least loss, ½ pound; the average loss per colony, 2 pound 5⅓ ounces.

Foul Brood.

No sign of foul brood was detected in the combs built upon foundation made from beeswax injected with the germs of foul brood.

Better Methods of Keeping Bees.

In conclusion permit me to impress upon bee-keepers the fact that we have found that large honey yields can only be secured by careful attention to the business. The points in management which require especial care are good wintering, providing plenty of stores during spring and keeping the bees together during the season; increase of colonies should be avoided rather than encouraged.

Too many bee-keepers are content with smaller yields than can be obtained.

R. F. Holtermann,
Apiarist.

Note.—This report of Experiments in Apiculture was received after the report of the Ontario Agricultural College had been sent to the printer, and, as it was not convenient to include it in that report, it was thought advisable to publish it in this report.

ANNUAL REPORTS

OF THE

POULTRY ASSOCIATIONS

OF THE

PROVINCE OF ONTARIO,

1899.

(PUBLISHED BY THE ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO.)

PRINTED BY ORDER OF

THE LEGISLATIVE ASSEMBLY OF ONTARIO.

TORONTO:
WARWICK BRO'S & RUTTER, PRINTERS.
1900.

POULTRY ASSOCIATION OF ONTARIO

1899.

To the Honorable the Minister of Agriculture:

DEAR SIR,—I have the honor of submitting herein the twenty-sixth annual report of the Poultry Association of Ontario, together with the essays on poultry industry, etc., and the financial statement.

Yours very truly,

THOS. A. BROWNE,

Secretary.

POULTRY ASSOCIATION OF ONTARIO

1899.

To the Honorable the Minister of Agriculture:

DEAR SIR,—I have the honor of submitting herein the twenty-sixth annual report of the Poultry Association of Ontario, together with the essays on poultry industry, etc., and the financial statement.

Yours very truly,

THOS. A. BROWNE,

Secretary.

OFFICERS FOR 1900.

POULTRY ASSOCIATION OF ONTARIO.

Honorary President	Hon. J. R. Stratton, M.P.P.	Peterborough.
President	Hon. Wm. Patterson, M.P.P	Brantford.
1st Vice-President	Mr. M. T. Burn	Tilsonburg.
2nd "	Mr. Wm. McNeil	London.
Secretary	Mr. Richard Oke	London.
Treasurer	Mr. Geo. G. McCormick	London.
Auditor	Mr. H. B. Donovan	Toronto.

Directors :

Mr. D. C. Trew	Lindsay	District No.	5
Mr. James Dundas	Deer Park	"	6
Mr. Thos. J. Senior	Hamilton	"	7
Mr. John Ramsay	Owen Sound	"	8
Mr. Thomas H. Scott	St. Thomas	"	9
Mr. Chas Massey,	Port Hope	"	10
Mr. Allan Bogue	London	"	11
Mr. Wm. Kedwell	Petrolea	"	12
Mr. W. J. Bell	Angus	"	13

Delegates to the Industrial Exhibition, Toronto,	Wm. Barber	Toronto.
	Chas Bonnick	Toronto.
" *Western Fair, London*	J. H. Saunders	London.
	W. H. Beattie	Wilton Grove.
" *Central Fair, Hamilton*	Rich'd. Mackay	Hamilton.
	G. G. Henderson	Hamilton.
" *Southern Fair, Brantford*	T. A. Cox	Brantford.
	W. Colwell	Paris.
" *Winter Fat Stock Show*	Wm. McNeil	London.
	A. Bogue	London.

LIST OF MEMBERS OF 1900.

POULTRY ASSOCIATION OF ONTARIO.

Name.	Post Office.	Variety of specimens exhibited.
Arthur, James	London	Silver Wyandottes.
Anderson, Wm	Palmerston	Pigeons, a large number of varieties.
Bogue, Allan	London	Partridge Cochins, Hamburgs, Dorkings, Polands, Houdans, Geese and Ducks.
Barber, Wm	Toronto	Games and Game Bantams.
Burn, M. T	Tilsonburg	Langshans, Black Wyandottes, Javas, R. C. White Leghorns, Red Caps, Games, Silver Polands, Geese, Ducks and Pheasants.
Bonnick, Chas	Eglinton	White Plymouth Rocks, Black Leghorns, Brown Red Bantams, Buff Cochin Bantams.
Baulch, J. H	Port Hope	Pigeons, a number of varieties.
Barker & Muir	Weston	Light Brahmas, White Plymouth Rocks, White Wyandottes, S.C. White Leghorns and Houdans.
Bogue, Geo	Strathroy	Light Brahmas, Silver, Black and White Wyandottes, Dominiques, Games, Houdans, Ducks.
Beattie, W. H	Wilton Grove	Bronze. White, Black and Holland Turkeys.
Bell, W. J	Angus	R. C. White Leghorns, Bronze Turkeys.
Cosh, Newton	Brantford	Andalusians.
Cook, Harvey J	Woodstock	Buff Wyandottes.
Cann & Daniel	Plattsville	Buff and Partridge Cochins, Buff Plymouth Rocks.
Cox, T. A	Brantford	Light Brahmas, Silver Grey Dorkings.
Chambers, W. H	Toronto	Orpingtons.
Dormer, Isaac	Peterborough	Light Brahmas.
Daniels, C. J	Toronto	Light Brahmas, Langshans, White and Buff Rocks, Golden Wyandottes, Javas, White and Black Leghorns, Red Caps, Game and Ducks.
Dundas, James	Deer Park	Buff Wyandottes, Buff Leghorns.
Donovan, H. B	Toronto	Game and Ornamental Bantams, Fowls and a large variety of Pigeons.
Dewey, E. J	Toronto	Langshans.
Elliott, Wm	Oshawa	White Plymouth Rocks.
Fox, Wm	Toronto	All varieties of Rabbits and Hares.
Field, Fred	Cobourg	Buff Wyandottes, Black Red Games.
Fink, A	Woodstock	Dominiques.
Fletcher, Wm	Toronto	Black Minorcas.
Garside, Jos	London	Dark Brahmas.
Geoghegan, Rev. T	Hamilton	Black Red Games.
Grimsley, Chas	Toronto	Black and Buff Wyandottes.
Geary, Wm	London	Buff Plymouth Rocks.
Goldey, T. H	Peterborough	Buff Cochins.
Gallingher Bros	Southend	White and Buff Plymouth Rocks.
Graham, A. W	St. Thomas	White and Golden Wyandottes, White Leghorns.
Head, Frank	Peterborough	White and Buff Plymouth Rocks.
Hare, F. C	Whitby	Buff Cochins, Buff Plymouth Rocks, Spanish.
Hand, J. B	Fenelon Falls	Silver Wyandottes.
Henderson, G. G	Hamilton	S. C. Brown Leghorns.
Holton, W. A	Hamilton	White Dorkings.
Junkin, W. T	Fenelon Falls	Buff Plymouth Rocks, White Leghorns, Andalusians, Pekin Ducks.
Jeffery, J. S	St. Catharines	Barred Plymouth Rocks.
Kettlewell, N. T	London	White Wyandottes.
King, Gordon	Oakwood	Light Brahmas, Buff Cochins.
Kedwell, J. W	Petrolea	Barred, White and Buff Plymouth Rocks, Black Red and Golden Sebright Bantams.
Knight, W. R	Bowmanville	Javas, Black and Brown Leghorns, Andalusians, Aylesbury and Rouen Ducks.
Keiley, I. J	Aylmer	Langshans, Black Wyandottes, Javas, White Leghorns, Game and Ornamental Bantams.
Karn, H	Guelph	Langshans, White Plymouth Rocks, Pekin Ducks.
Lund, F. G	Peterborough	Light Brahmas.
Luxton, A. G. H	Georgetown	Dominiques, White, Black and Holland Turkeys, Geese and Ducks.
Lenton, Jas	Oshawa	Barred and White Plymouth Rocks, Golden and Silver Wyandottes, Pekin Ducks.

LIST OF MEMBERS.—*Concluded.*

Name.	Post Office.	Variety of specimens exhibited.
Lean, John	Powle's Corner	Silver Grey Dorkings and Bronze Turkeys.
McNeil, Wm	London	Black and White Cochins, all Hamburgs, all Ornamental Bantams, all Polands, etc.
McCurdy, R	London	Black Langshans and Dressed Fowls.
McPhie, Norman D	Hamilton	Jacobin's and Show Homer Pigeons.
Machey, Hugh	Peterborough	Light Brahmas, Partridge Cochins, White Plymouth Rocks, Indian Game, Turkeys, Geese, Dressed Fowls.
Miller, G. W	London	Barred Blymouth Rocks.
Mann, Wm	Peterborough	S. C. Brown Leghorns.
Massie, Chas	Port Hope	White Pouters, Jacobins, White Fantails.
MacKay, R	Hamilton	Barred Plymouth Rocks.
Minshall, J. H	Brantford	White and Black Minorcas.
Moore, F. G. L	London W	White Wyandottes, Cochin Bantams.
Mitcheltree, W. L	London	Pyle Game Bantams.
Magill, J. H	Port Hope	All varieties of Pied Pouters.
Milton & Mitcheltree	London	Andalusians and Houdans.
Nims, H. F	Dresden	Barred Plymouth Rocks.
O'Brien & Colwell	Paris	White Turkeys, all Geese, all Ducks, Brown Red Duckwing, Pyle and Indian Game.
Oke, Richard	London	Partridge Cochins, Black Wyandottes, Javas, R.C. White Leghorns, all Hamburgs, all Ornamental Bantams, all French varieties.
Oldrieve, G. S	Kingston	Golden Wyandottes, Brown Leghorns, Game and Ornamental Bantams.
Parsons, J. H	Osaca	Buff Plymouth Rocks, Indian Game and Dressed Fowls.
Palliser, C. W	Campbellford	Brown Leghorns, Black Minorcas, Silver Grey Dorking.
Rice, Thos	Whitby	White Plymouth Rocks, White and Brown Leghorns.
Robinson, W. E	London	Indian Games.
Richardson, H. D	Brantford	White Wyandottes.
Ramsay, John	Owen Sound	S. C. White Leghorns.
Rankin Bros	Owen Sound	Cochin Bantams.
Steele, Jos	Villiers	Partridge and White Cochins, Barred Plymouth Rocks, Indian Games and Pekin Ducks.
Sage, Lewis	London	Light and dark Brahmas.
Shales, Mrs. J. H	Toronto	Buff and White Wyandottes, Black and White Minorcas.
Stone, J. Fred	Toronto	Orpingtons.
Scott, Thos H	St. Thomas	Langshans, Buff Plymouth Rocks.
Sherlock, Thos	London	Pyle Games.
Stewart, Chas. A	London	Buff Cochins.
Stewart, Wm. & Son	Menie	White and Brown Leghorns, Minorcas, S. S. Hamburgs, Red Caps, S. G. Dorkings, Houdans, geese and Ducks.
Trudel & Co	Ottawa	A large variety of Pigeons.
Turville, F. N	London	Game Bantams.
Taylor, J. G	Woodstock	S. C. White Leghorns.
Trew & Williamson	Lindsay	Barred and White Plymouth Rocks, White Leghorns and Houdans.
Wright, Walter	Cobourg	Buff Cochins, Barred and White Plymouth Rocks, Black, Red and Cochin Bantams, W. C. B. Polands, Pekin Ducks and Pheasants.
Wedjery	Woodstock	Black Wyandottes.
Wyatt, Hugh	London	Light Brahmas, Buff and Partridge Cochins.
White, Geo. F	Hamilton	S. Sebright, Bantams, Carriers, Barbs and Magpie Pigeons.
Wilson, F. B	Sherbrooke, Que	White and Buff Plymouth Rocks.
Wilson, Matt	Fergus	Barred Plymouth Rocks.
Bell, Dr. A. W	Toronto	Members but not Exhibitors this year.
Dunstan, Robt	Toronto	
Saunders, J. H	London	
Patterson, W. Jr	Barrie	
Collins, Wm	Peterborough	
Leary, R. H	Peterborough	
Gisborne, F. H	Ottawa	
Crowe, John	Guelph	
Senior, T. J	Hamilton	

POULTRY ASSOCIATION OF ONTARIO.

ANNUAL MEETING.

The twenty-sixth annual meeting of the Poultry Association of Ontario was held in the Council Chamber of the Town of Peterboro, on Thursday afternoon, January 11th, 1900.

PRESIDENT'S ADDRESS.

The President, the Hon. J. R. STRATTON, Provincial Secretary, occupied the chair, and about 100 members were present. After calling the meeting to order the President said he wished to thank the members of the Ontario Association for the great honor they had conferred on him by electing him to the office of President at their annual meeting last year in the city of Toronto. Upon being informed of the action of the meeting he was very much concerned as to how he could find the time to perform the duties devolving upon the presiding officer of an important association of this kind, but he had found that the work required but little of his time, owing to the competency and willingness of the Secretary, who with an experience of over eight years to his credit, and the reputation of having filled the position with splendid satisfaction during that time, had again shouldered the work and left the President's duties but light, and if the members present were satisfied with the manner in which their affairs had been conducted this year, simply give the credit to the Secretary.

As the member for that constituency in the local Legislature, he welcomed the visiting breeders and fanciers to Peterborough, and was of the opinion that by holding the show there it would revive the old time poultry spirit in the neighborhood, and give to the poultry industry an impetus, and stimulate it to such an extent as would be a lasting benefit to the breeders and those interested in that section of the Province, and would also be the means of commanding the attention of our farmers to the vast importance of this feature of Canadian trade and the immense value it is to them personally.

He hoped the members and visitors to the exhibition would carry away with them many happy recollections of their visit to Peterborough, and that before many years elapsed the town would be again favored with the poultrymen of Ontario.

THE SECRETARY'S REPORT.

As has been my custom in past years, I purpose merely to outline my report at this time so as not to anticipate the remarks that any of the members present may wish to make in relation to any subject that has been suggested by the individual members for our mutual improvement since the last annual meeting, and am careful to follow this rule here to-day, promising to take up at a subsequent time anything that occurs to me as having been omitted.

As you may be aware, a copy of the proceedings of this meeting, as they relate to notices of motion, question box, and essays have been in the hands of the members for about three weeks, with the request that they examine into them and come prepared to ventilate their views on each of the subjects. I therefore look forward to the most interesting and instructive meeting we have ever held since my appointment as their Secretary nine years ago.

As you are all aware, this is the last time I shall address you in my official capacity as Secretary. My late appointment compels me to retire, and, this being the case, my mind naturally goes back over the ground we have travelled together and the paramount thought arises, have we accomplished anything, have we advanced since then, has any good been done by our united labors? And I cannot but admit as answering, "Yes—many things."

The specimens on exhibition have improved wonderfully. The number of exhibitors has increased to a great company. The number of local shows was never so many (twelve being advertised in the *Canadian Poultry Review* for November to take place during December and January); the like never was even thought of before. The industry has grown to enormous proportions partly through our efforts. The show rooms are more complete in their furnishings, coops, etc., the judging is more expediously done, allowing the placing of awards early, giving the exhibitors the benefits therefrom, and the Association has been put in a better financial position.

There are some, but not by any means all, of the good results directly the outcome of the "Ontario." It is in your hands that even larger and better results may be accomplished, and I look to your action to-day to be another step forward by giving the country through the Department of Agriculture's report your views on the questions of interest to every farmer engaged in this great industry.

While it is not possible to report as large an entry as at Toronto or London, the quality is equal to either, if not superior. Why the entries are not so large is, I think, owing to the location of Peterborough, being such a long distance away from our western exhibitors, but when they are told of the management, show hall, and the hospitality that has been accorded to us by the local association and people of the town generally, they will no doubt wish they had been of our number. In my opinion the hall is the best for our purpose of any we have yet occupied. The total number of specimens is 1,339, and the receipts for entries, $626.05, while the membership is 101, so you see we are still a very good showing.

There are one or two matters that I would wish my successor to try his best to arrange. The first is that each local association asking for the "Ontario" show will be able to promise that they will endeavor at least to obtain from their city council sufficient grant to enable them to take the admission fee from the door and allow the public in free. The other is that the Minister of Agriculture be applied to for an additional grant to permit the Association to have control of the Dressed Poultry Department and the object lessons connected therewith, such as you have seen to day, only on a much larger scale. This, gentlemen, is clearly your duty, and must be had if constant and assisted efforts will result in your getting hold of it, as it is a great factor in the poultry industry in relation to the markets of the world. It is also the greatest educational medium to get hold of our own farmers, and also the greatest of all attractions for exhibitions like our own. It was the most attractive feature at the Fat Stock Show in London this winter, but was thought by many decidedly out of place when connected with a cattle show. I am sure the President being also a member of the Ontario Cabinet, will assist you to secure from the Minister of Agriculture the necessary funds, and also the management of this part of your work.

Thanking you one and all for the very many acts of kindness and appreciation, also the courteous manner in which I have been treated at all times, and wishing assistant officers and members every success in the future, and promising not to forsake you altogether, I wish you a Happy New Year, and may the "Ontario" march steadily onward and upward.

THOS. A. BROWNE, Secretary.

The minutes of the last annual meeting, held at Toronto, were taken as read, having been printed in the annual report of the Department of Agriculture.

The minutes of the Board of Directors' meetings, held since the annual meeting, were read, and on motion, received, and their actions therein confirmed.

The following communications were read by the Secretary :—From the Hon. John Dryden, Minister of Agriculture for Ontario; the Hon. Sydney Fisher, Minister of Agriculture for the Dominion; Prof. Jas. W. Robertson, Commissioner of Agriculture, Ottawa; Dr. Jas. Mills, President of the Ontario Agricultural College, Guelph; Prof. Wm. Saunders, Director Experimental Farm, Ottawa; Mr. Geo. H. Bertram, M.P., for Toronto, and J. W. Kedwell, of Petrolia; all of them expressing regrets at not being able to be present at our annual meeting. From W. S. Middlebro, Mayor of Owen Sound; J. V. Teetzel, Mayor of Hamilton; W. W. Telfer, Secretary of the Poultry Association of Brantford, each of them extending a cordial invitation to hold the next annual meeting in their respective cities.

TREASURER'S REPORT

FOR THE YEAR ENDING DEC. 31ST, 1899.

In the absence of Mr. Geo. G. McCormick, the treasurer, the secretary read the following financial statement, duly audited, showing the receipts and disbursements in connection with the International Exhibition of the Poultry Association of Ontario, and the American Poultry Association of the United States, held in the City of Toronto, January, 1899.

RECEIPTS.		DISBURSEMENTS.	
Balance brought forward	$ 127 57	Prizes paid in cash (including P. O. Com.)	$1,645 98
Ontario Government grant	900 00	" " " value	813 25
" " " special	300 00	Judges fees and clerks for judges	289 25
Membership fees	222 00	Clerk's in Secretary's office, extra work reporting and preparing reports for dept.	26 00
Entry fees	1,158 13	Interest paid on loan	41 00
Special prizes donated in cash	300 00	Advertising and printing	117 50
" " " value	813 25	Postage, express, telegrams, etc.	71 78
Interest from bank on deposits	5 53	Visitors to the Agricultural College, Guelph	89 20
		Secretary's salary	150 00
		" expenses at Toronto & fares	10 40
		Auditor's fee voted by Directors	20 00
		Toronto Poultry & Pet Stock Association, towards expenses	405 00
		Balance in bank	145 12
	$3,824 48		$3,824 48

Audited and found correct.

H. B. DONOVAN.

Toronto, Aug. 24th, 1899.

Moved that it be received and adopted.—Carried.

MR. BROWNE'S RESIGNATION.

Mr. Thos. A. BROWNE then read his resignation as secretary of the Association, a position he had occupied for the past eight years, expressing his heartfelt regrets at parting, and thanking the members for their continued confidence and assistance during his term of office and wishing for the Association a prosperous future.

The resignation was accepted and the appointing of his successor referred to the incoming Board of Directors

Owen Sound was selected by vote as the place for holding the annual meeting and show in 1901.

Officers and directors were elected as given on page 4, of this report.

ADDRESSES BY VISITORS.

Mr. FRANCIS H. GISBORNE, Secretary of the Eastern Ontario Poultry Association, was present, and being called on by the President made a few remarks in the course of which he said that he was glad to see so many present and to see such a good show. He had been able to learn considerable from the system by which the Ontario Poultry Show was run, and requested the breeders present to honor the Eastern Show by sending in a good large entry. He was a "practical" poultry breeder, and doubted if it were wise for breeders such as Mr. Bogue and others, to use the term "fancy" poultry so frequently. Fancy poultry are necessary to a good show, but the great mass of the poultry now on exhibition were not of that class but really and truly practical poultry. Our principal (so-called) fancy breed is the Plymouth Rock, yet there is no fowl to-day that will bring the farmer so much profit in eggs and meat, and in his opinion (gained from experience) there is no breed that can excel the Plymouth Rock from the farmer's standpoint.

The farmers are the great producers, and to them must we look for the country's prosperity The poultry fanciers are teaching the farmers how to keep their stock, how to get more eggs and better eggs, and more meat and better meat. No government can do too much for the poultry industry for it is one of the greatest industries of this country, and for the small sum expended on it by the government is bringing in great returns to the country generally.

He advocated Government aid to the local or county Association, and in view of the fact that the Hon. President (being also a member of the Government) having looked favorably on this matter there should be some chance for the local association, as it is decidedly an advance step and should result in much good. He thanked the members for their attention and resumed his seat amid applause.

Mr. A. G. Gilbert was then introduced by the President as Poultry Manager of the Experimental Farm, Ottawa, and in his opening remarks expressed the very great pleasure it afforded him to address the members present at any time, but more particularly on this occasion, surrounded by so many of his old friends. He wished to congratulate the President and committee on the magnificent display of birds then on exhibition in the town hall, and, although they were not so numerous as on some former occasions the quality and type of birds were never surpassed.

He had observed with pleasure the marked increase in size of the White Leghorns and Plymouth Rocks. This certainly showed progress and in the right direction. There should be a type in poultry as in cattle or any other stock, and it was a matter of great moment what that should be. He was not going to state which was the best fowl, but it was the breeders' duty to see that the type, whether for flesh or eggs, or for both, was not permitted to degenerate. The speaker recommended the Plymouth Rock or Wyandotte to the farmers for the following among other reasons: they can be got easily and cheaply, and are suitable to any locality. It was sometimes said to him that that Orpingtons or Dorkings are splendid flesh forms, and no doubt they are, but for one Orpington or Dorking the farmer could get a thousand Plymouth Rocks, and at a reasonable figure. It was often asked him what was he best plan for the farmer to adopt in order to get a flock of thoroughbred Plymouth Rocks. A good plan is to buy a male and three or five females from a reliable breeder in the fall or early spring. Let the farmer hatch out all the eggs from these fowls up to beginning of June. In the fall he would have a lot of cockerels and pullets. The former he could sell and their value would go a long way to recoup for first outlay. The pullets would be worth $2.00 each as prospective winter layers, and then there would be the old stock on hand likewise. New methods of farming were being taught, and farmers in order to be up-to-date, had to learn them Time was when the farmer received $1.25 or $1.20 per bushel for his wheat. At that time he grew hardly anything else. His cows and poultry received little or no consideration. But that time came when it did not pay to grow wheat to sell on the market. The Ontario farmer found himself face to face with changed conditions, that were almost tantamount to an agricultural crisis. What did he do? He took up the long neglected cow, and by intelligent management, she became a great revenue maker. Indeed, last year her products sold in England brought seventeen millions of dollars to this country. With the same intelligent manipulation, the hen would be found a proportional source of wealth.

NEW BUSINESS.

1. Moved by Dr. A. W. Bell and seconded by H. B. Donovan, "That the By-laws and Rules and Regulations governing the Association and the Exhibitions held by us be revised and printed in the next issue of the Prize List after being ratified or in book form. Style and quantity as may be decided upon." Carried.

2. Moved by Geo. W. Miller and W. J. Bell, "That the five members hereinafter named, together with the President and first Vice Presidents, be a Committee to revise the By-laws, etc., and submit same to the directors at their first meeting for consideration and recommendation, and by them referred to the next annual meeting for confirmation if satisfactory or further action." Carried, and a resolution was also adopted that the following shall constitute the committee: Messrs. Allan Bogue, F. J. Senior, Thos.

A. Browne, G. W. Miller, H. B. Donovan and Dr. A. W. Bell, the President and Vice-President.

3. Moved by Thos A. Browne and D. C. Trew, "That hereafter members who have not paid their membership fee for the current year on or before the closing date for receiving entries, shall not be entitled to vote at the Annual Meeting, but may take part otherwise as a fully qualified member.

The mover explained the object he had in making such a motion was to prevent a number of persons being made members who were in no way interested in the welfare of the exhibition or its objects, of being able by their votes to dictate to the *bona fide* exhibitors where the shows shall be held from year to year, and other matters of as grave importance. It was thought to be a delicate question, and it was decided to refer it to the By-law Committee for consideration and their report.

4. Moved by Allan Bogue and J. G. Taylor, "That the Board of Directors be empowered to select five persons to write an essay each on a suitable poultry subject (the subject to be approved of by the President and Secretary), of 1,000 words, the same to be the property of the Association. For publication in pamplet form and distributed to each member on receipt of his or her membership fee and for discussion at Annual Meeting if desired. The essays to be delivered to the Secretary on or before the 1st day of December of the same year as his appointment, and that a nominal sum of three dollars be paid to each writer whose essay is approved of by the Executive Committee."

Moved in amendment that the matter be referred to the new Board of Directors with power. The amendment carried.

5. Moved by Wm. McNeil and D. C. Trew, "That Rule 17 of the Entry Sheet be amended to read: 'Exhibitors desiring to have their birds scored may arrange with any of the judges engaged by the Association to do so after the judge has completed his regular duties (not before). The judge to supply the score card and collect a fee of ten cents for each bird he scores, and that this be included in the arrangements with the judges when accepting their positions."

Dr. A. W. Bell, of Toronto, in speaking to the motion, said arrangements should be made with each judge to stay at the show at least two days. He was informed that one of the judges at the present show had spent but three and one half hours at his work and left his classes unfinished and in a most unsatisfactory state to the exhibitors. It was referred to the new Board with the suggestion that at least two days should be spent at each show by the judges, and that this was not to much to insist on for the fee paid. The response accorded these remarks left no uncertain sound as to the feelings of the exhibitors present on this most important factor of our shows—proper judging—and it is to be hoped will have a lasting benefit.

QUESTION BOX.

Q. I want to raise one hundred pullets for winter laying. How many eggs should I set, and would you advise hens or incubators, and why?

A Member: The first great difficulty that I see in this question is to be sure that the eggs are going to be "pullets" when hatched; but whether the result are so or not makes little matter as the cockerels are all right for marketing and will bring a good profit if properly dressed. Get a pen of first-class fowl and await the results.

Mr. Gilbert: Buy a cockerel and four pullets and raise all possible from this pen the first year. Next year buy an incubator, if you see fit, and continue raising by artifical means.

Mr. McNeil: Agreed with the former speaker and added: I have seen a four-pound White Cochin lay at four months and eight days old and continue at it.

A Member: Chickens can be hatched out either way, but with less trouble by incubators. It is hard to say how many eggs should be set or put into incubators to ensure 100 pullets.

Q. To get eggs in winter, when prices are high, what breeds should be used and at what date should they be hatched? Are pullets or one year old hens the better?

The SECRETARY: If this question can be settled by poultry breeders then we must accept as a fact that there are many breeds, and not one particular breed, that are good layers, and the person in charge has as much to do with the quantity as the hen. Proper house, feed and attention are as necessary with fowls as with any other variety of animal to obtain the best results. Indian game cross is a first-class combination.

Mr. TREW: I think a hen is an egg machine, she must lay if she is fed properly and get the desired amount of exercise.

Mr. GISBORNE: It is not a question of a "best breed" of hen, it is a question of a best breed of poultry keeper. There are several breeds that will lay well.

Mr. MCNEIL: To get eggs pullets are the best. Feed them and they must lay; they can't help it. The smaller breeds are the best layers.

Mrs. SHALES: If you get pullets out in April they will lay by September or first of October. In my opinion nothing can beat the Wyandottes, and the buffs with me have laid three weeks ahead of the whites. My house is very dry, board floors, lath and plaster inside, ventilated freely, and cleaned out every morning. Dampness is worse than dirt as a disease producer, and is fatal to the production of eggs. Keep the birds sheltered from the cold fall rains. Both Wyandottes and Plymouth Rocks are good winter layers, the Minorcas I have found useful as summer layers.

Mr. HARE: I have three breeds, Cochins, Spanish and Buff Rocks, and I can make any of them lay. Most breeders feed too much corn. Green bone is excellent as an egg food. Take the fowl you like best, feed properly and they will lay, any of them.

Mr. BONNICK: Anyone can take ten or fifteen hens and can get more eggs from them proportionately than from one hundred. They get more care, more tit-bits. You have to feed for show or for egg results; you cannot get both. Better results may be had in winter from pullets than from hens. You cannot get better layers than Leghorns.

R. OKE: If properly cared for and fed the hens of many breeds will lay well in winter. Pullets will lay most eggs, but the eggs from the hens will be the largest.

Q. What mixture would you advise for fattening chickens and turkeys when not confined to regular fattening coops, or are the latter a necessity? Where fattening large numbers they entail a good deal of work. Can they not be fattened in flocks?

Mr. BELL, of Angus, Ont.: Turkeys will fatten best where given free range. I find wheat best.

Mr. GILBERT: We have found ground grain best. No trouble in getting flesh on cockerels by proper feeding when let run. Use the cheapest feed you can get in your neighborhood and use bone. We get fresh bone at one-half cent per pound.

Mr. COLLINS: Certainly turkeys and chickens can be fattened in flocks. Chickens might be penned up and fattened for fifteen days before being killed with good effect. It is necessary that chickens and turkeys be carefully looked after and regularly fed from time of hatching.

Q. Do you advise the use of milk as a drink for young chicks, and if so, sweet or sour?

SEVERAL MEMBERS: Either way is good. Better still, use to mix the soft feed.

Mr. BROWN: If for young chicks, I prefer skim milk.

Q. Can we ship eggs to New York or Boston, say in case lots, and make a profit? I mean a strictly fresh first-class article.

Mr. GILBERT: A friend of mine told me that he sent eggs to Boston and also New York in winter and at a profit, but have nothing to prove the statement.

Q. Is 6½ cents per pound, live weight, equal to 10 cents per pound dressed as claimed by dealers, or is this too large a loss?

Mr. BURN: I kill hundreds, and find that seven cents live weight costs nine cents dressed.

Mr. GISBORNE: On fat chickens the loss is small, it depends greatly on the condition of the bird.

A MEMBER: Much depends upon what is meant by dressed. If the neck of the fowl is simply dislocated, the blood allowed to remain in the neck and the feathers removed, I would take the 10 cents every time. If the bird is drawn and trussed I would then want more than 10 cents per lb. Some of the chickens (Barred Plymouth Rocks) killed at the Ontario last January weighed seven pounds each with neck dislocated and blood in body. They were worth 10 cents per lb, so 6½ cents per lb. live weight would be far from what they would be worth. Scrubs are dear at any price and not fit to market.

Mr. HARE reported the result of correspondence he had had with the customs at Washington, whereby he saved his United States customers the duty, heretofore enforced, of three cents per pound, and promised to send the final letter to the *Review* for publication.

The President here introduced the Essays as published and circulated to each member prior to this meeting, so that they might take them up and discuss their contents.

Several members remarked that they had read them over and could find no fault with the writers' expressed opinions, and the time being late they were accepted and ordered to be published as a portion of the annual report for the benefit of the farmers and poultry breeders throughout the Province.

THE RETIRING SECRETARY THANKED.

The following resolution was moved by Mr. Donovan, seconded by Mr. Collins, and unanimously carried: "That the thanks of the Ontario Poultry Association be tendered to Mr. Thos. A. Browne, Secretary of the Association, for the very efficient manner with which he has performed his duties during the past eight years—and we take this opportunity of congratulating him upon his appointment to the important position of postmaster of the city of London.

Mr. BROWNE in responding, could not thank the Association too much for their kind expression of approval of his work, which he had always found to be a pleasure as well as a duty.

A hearty vote of thanks was ordered to be forwarded to Hon. Sydney Fisher, for his kindness in permitting Mr. and Mrs. Gilbert and Mr. and Mrs. Yuill to attend the meetings where their advice and practical demonstrations were highly appreciated.

DIRECTORS' MEETING.

A meeting of the newly-elected Directors was held at the close of the Association meeting with Mr. T. Burn, first vice-president, in the chair and Mr. H. B. Donovan acting as secretary.

The matter referred to them, *re* engaging writers of Essays for the next annual meeting along the lines laid down in the original motion, was on motion adopted.

They also considered the membership clause, and decided that the present system be continued.

Mr. Richard Oke, of London, was the unanimous choice of the meeting for Secretary. Mr. George G. McCormick was re-elected Treasurer. Mr. H. B. Donovan was re-elected Auditor, and the salaries in each case to be the same as in the present year.

It was decided to store the wire coops, etc., until the next show in Peterborough, the same to be insured against loss by fire, for which the local Association were voted fifteen dollars to cover all expenses connected therewith, and to ship the same to Owen Sound as directed.

The meeting adjourned until Thursday afternoon, September 6th, 1901, at the Toronto Industrial Exhibition. The by-law committee to meet at the call of the chairman, the present by-laws, rules, etc., to form part of the annual report.

VARIETIES ON EXHIBITION.

Statement of the different varieties of fowls, etc., on exhibition at Peterboro', January 9 to 12, 1900, and the number of each:

Varieties.	No.	Varieties.	No.
Brahmas	35	Dorkings	32
Cochins	67	Polands	66
Langshams	35	Houdans	22
Plymouth Rocks	121	Creve Cœurs	4
Wyandottes	107	Lafleche	8
Dominiques	14	Sultans	8
Javas	25	Orpingtons	12
Leghorns	101	A. O. S. variety	20
Spanish	6	Turkeys	36
Minorcas	21	Geese	33
Andulasian	16	Ducks	64
Hamburgs	51	Pheasants, pigeons, etc	183
Red Caps	10	Dressed fowls	16
Games (all kinds)	111		
Bantams	122	Total	1,346

Names of places represented by the exhibitors in attendance and the number o specimens from each place—41 towns, 23 counties, extending the length and breadth of the Province:

Place.	County.	No. of entries.	Place.	County.	No. of entries.
Angus	Simcoe	9	Palmerston	Wellington	26
Aylmer	Elgin	21	Paris	Brant	51
Brantford	Brant	31	Peterborough	Peterborough	53
Bowmanville	Durham	18	Petrolia	Lambton	11
Campbellford	Northumberland	4	Plattsville	Brant	4
Cobourg	Northumberland	32	Powle's Corners	Lanark	8
Dresden	Kent	1	Port Hope	Durham	62
Deer Park	York	8	Sherbrooke	Quebec	5
Eglington	York	13	Strathroy	Middlesex	23
Fenelon Falls	Victoria	7	Southend	Welland	4
Fergus	Wellington	1	St. Catharines	Lincoln	5
Georgetown	Halton	19	St. Thomas	Elgin	21
Guelph	Wellington	11	Toronto	York	202
Hamilton	Wentworth	39	Tilsonburg	Oxford	37
Kingston	Frontenac	29	Villiers	Peterborough	9
London	Middlesex	383	Weston	York	12
Lindsay	Victoria	20	Wilton Grove	Middlesex	18
Menie	Northumber'and	30	Woodstock	Oxford	22
Oakwood	Victoria	4	Whitby	Ontario	37
Oshawa	Ontario	14			
Ottawa	Carleton	29	Total		1,346
Owen Sound	Grey	13			

During the demonstrations by Mr. and Mrs. Gilbert and Mr. and Mrs. Yuill in killing, drawing and dressing fowls suitable for the British or home markets—in the show room—the following questions were prepared by Mr. Wm. Collins, Mr. R. J. Winch and others, and through Mr. Winch as spokesman they asked Mr. Gilbert, of the Experimental Farm poultry department for answer to each, and being from such a reliable authority cannot help but be useful to all who are in any way interested in preparing fowls for table use or market:

1. Should poultry be fasted before killing? If so, how long? Certainly, for twenty-four hours at least.

2. Which is the proper way to kill them? By breaking the neck, if for the English market, and bleeding, if for the Canadian market.

3. Should they be scalded or dry picked? Dry picked by all means; scalding spoils appearance of skin and prevents them keeping well.

4. Should poultry be put into cold water over night in order to keep them in warm weather, or what effect would it have on them? No; it spoils both their skin and appearance.

5. Will poulty keep better and longer properly fastened or not properly fastened and drawn, or not drawn? No, they will not keep as well drawn as undrawn.

6. Should poultry have their legs tied up with a cord before bringing them to market for sale? Yes; it enhances their value by making a poor bird look well.

7. What do you consider the difference in price between well fattened stock or medium or poorly fattened stock? Our poultry must not be sent to the British market unless properly fattened. Unless properly fattened we would lose from three to five cents per lb.

8. Should poultry be allowed to run at large while being fattened or should they be penned up in a small, dark place? The quickest way is to pen them up.

9. Is there any other way to fatten poultry quicker than the usual way farmers handle them? Yes, by special methods and foods, and by a forcing apparatus.

10. Is it cruel to force poultry while they are being fattened? No.

11. What effect does it have on poultry brought to market with their crops full? The contents of the crop decomposes, and in consequence the carcass is tainted.

12. Does it lessen the value of poultry to run them in order to catch them before killing? Yes.

13. Should poultry be allowed to freeze before being marketed? No.

14. After bleeding or cutting their heads off, is it cruel to pick the feathers off while the bird is still kicking? No.

15. Would you advise selling poultry by weight? Would you not think it was the fairest way? Also eggs? Yes, by all means; eggs also.

IMPORTANCE OF DRESSED POULTRY AT OUR SHOWS.

By Geo. W. Miller, London.

It has often occurred to me that our poultry shows do not strike the practical chord with the vigor they ought to. We are in the habit of seeing birds at these shows that are as near perfection in shape and feather as the ingenuity and skill of man has been able to produce, and we are accustomed to hear the assertion over and over again in the show rooms, as well as to see it regularly repeated in the columns of the poultry press, that the thoroughbred—or, more correctly, Standard bred—fowl is the most profitable for the farmer and market poultry man. I firmly believe this to be so—yea, further, I know it to be true, for I have kept the mongrel and the Standard bred, and know that in my yards the birds that come nearest perfection from the fancier's standpoint are the greatest money-makers. When I say this I have no reference to the trade that comes to the fanciers from the advertisement that a win in the show room brings to him, but simply to the ordinary market trade in dressed poultry and eggs.

It would be difficult to find a fancier who would take exception to this contention, but what are we, as fanciers, doing to convince the farmers, who form the great bulk of the poultry raisers of Canada, that we are right. Simply nothing. We give them the bald assertion, ask them to buy a mating or setting of eggs from our stock, and prove for themselves that what we tell them is true. They say in reply that we are cranks, led away by our enthusiasm for beautiful feathers, and there the matter generally ends as far as they are concerned.

If the Standard poultry breeders of this country, particularly those who make a specialty of the American, Asiatic and Mediterranean breeds, would take hold of the question with the same vigor they display in promoting the fancy end of the business, I am satisfied we should soon enjoy a boom in the poultry industry in Canada that would

amount almost to a revolution, and that would give our dressed poultry and eggs as high a premium in the markets of the old world as our cheese and butter to-day possesses.

How are we to prove to the farmers that the Standard-bred fowl is the superior of the old fashioned barnyard mongrel? This is a question that requires the best consideration of the members of the Poultry Associations of Ontario, and I have no intention here of presuming to answer it finally. I am satisfied that the members of the "Ontario" are not in the least degree behind the members of the kindred associations that deal with the cow, hog and sheep and their products, in intelligence and enterprise, and that if they will take hold of this matter in earnest it will not be long until the greatest success is achieved. It is simply the purpose of this article to bring this important question prominently to the attention of the members of the Association and of my fellow-fanciers generally, and to throw out a few suggestions for their consideration.

More attention must be given to dressed poultry and eggs in the show room if the poultry industry is to go ahead as it deserves. At all our leading shows the individual fancier should not only make an exhibit of his best breeding specimens alive, but of the dressed birds that are produced from such stock. To foster this feature substantial prizes should be given on the dressed birds, even if it means the reduction of the regular prizes, but I do not think this would be necessary. The Government would, I am informed, be willing to substantially supplement the present grant to encourage this feature at the "Ontario." But increased Government assistance or not, dressed poultry should not be side-tracked as it is at present. Take up the prize list of the present show, and we find that only $3.50 is allotted for prizes in this department. Turkeys compete with Plymouth Rocks, and Plymouth Rocks with geese, and geese with ducks. No rule is laid down to govern the judge or the exhibitor in this department, and the exhibitor is forced to pay a fee of fifty cents for each specimen or pair (the prize list does not say which) he exhibits, and in return he may get $2 00 back if the judge fancies his specimen most. This is a serious reflection on the wisdom of the Directors of the Association.

Separate classes should be provided for dressed Plymouth Rocks, Wyandottes, Langshams, Cochins, Brahmas and other varieties; for turkeys, geese and ducks. Further, the classes for the different breeds should be sub-divided. For instance, there should be classes for barred, white and buff Plymouth Rocks, so that the table value and appearance of the different varieties may be judged. And the same with the other general purpose or utility breeds, and the turkeys, geese and ducks. The prizes in this department should be as large, or larger as on the live specimens, and the entry fee, not including the Association membership fee, should be abolished. Instead of only $3 50 being awarded as premiums in this department at least $350 should be given.

To further accentuate the superior market qualities of the stock that comes from the show bird, an exhibit might be made comparing it with the poultry that is usually found on our markets and in our meat shops.

The egg side of the industry should not be lost sight of, either. This country exports eggs by the million every year, and the fanciers have been losing a golden opportunity in not taking steps to prove to the egg farmer that the uniform eggs that came from the Standard bred of any of the breeds are much more profitable than the varied lot that is usually collected at the farm houses of the land. The Directors have only allowed $2.00 as prizes on eggs, and charge an entry fee of 25 cents.

The increased trade that would come to the fancier by thus giving prominence to dressed poultry and eggs in the show room would be very large, I am convinced. Let me illustrate: An exhibitor, we will say, wins on Plymouth Rocks in the live department. A farmer comes along and admires the beautiful feathers on these specimens but doubts their utility. The exhibitor takes him over to the dressed poultry exhibit and points out the fowls prepared for market that came from his winning cock, or the eggs that his winning hen or pullet produced. Will it not be vastly easier to make a sale to that farmer than if no such object lesson was at hand?

If properly presented to the Government, I am sure no difficulty would be experienced in having a substantial grant made for this department of our shows and particularly of the "Ontario." This year $300 was given to the Fat Stock Show to be expended on dressed poultry and eggs, and I think a like sum or even larger, could be secured for the "Ontario." It could also be induced to furnish cold storage facilities for the specimens

while on exhibition similar to that furnished for butter and perishable dairy supplies at the Western and other fairs.

In conclusion, let me say, the Standard bred fowl is as much ahead of the barnyard mongrel as the modern binder is ahead of our grandfather's sickle in the harvest field, and we fanciers are failing in our duty if we do not make every possible effort to convince the farmer of this fact.

POULTRY FOR PROFIT.

By Thomas Brown, Durham.

The first thing to be considered in order to make a success in the poultry business, is the location and buildings. To be successful you must have good comfortable buildings and plenty of grass runs, to have healthy and vigorous stock. If your buildings are poor and your fowl allowed to become stunted from cold and disease, and the want of proper care, then comes the most effective loss in the poultry business, that of a lot of poor, delicate fowl that will neither lay eggs or ever be fit for the market or show.

The most successful ones in the poultry business are those that pay attention to their stock, and do not allow them to become stunted by disease or vermin. Good food, good shelter, plenty of grit and pure water, with proper attention are the most essential points in poultry keeping in order to bring the fowl to maturity.

The poultry farmer to be more successful must keep the stock his market requires. If his market wants eggs, then he will have to keep some of the egg-laying strain, such as Leghorns, Minorcas, etc. If his market calls for table fowls, then he must keep the heavy varieties, but if he wants fowl for both purposes then the Rock or Wyandotte can be used. But whatever market you cater to, you must have the best quality to sell, for if you once impose upon your customers by giving them inferior stock at superior prices, then your chances of success in the poultry business goes down to ruin, and this is one of the common mistakes whereby a great many poultry keepers fail.

Whatever kind of stock you keep be sure they are thoroughbred, as it costs no more to keep good fowl than mongrels. By going so you can make an extra profit by raising birds for exhibition and breeding purposes, and also reap your share of prizes at the poultry shows. In making up your breeding pens have no culls or inferior stock in them; breed from the best always. You cannot be too particular in culling for this purpose. It is only a waste of food to keep inferior stock over, they should be marketed or used for home consumption early as only the best will do to breed from or win at the shows.

An important point to consider is the requirements of your market. You should make a careful study of the markets you are going to dispose of your produce at. Supply them with the class of goods they want, and have it placed on the market in a neat and attractive manner. Nothing mars the sale of poultry more than to have it exposed for sale in a dirty and unattractive shape.

Any one carrying out the few suggestions I have penned above cannot help but be successful in the poultry business and make it profitable.

WHAT I WOULD DO IN THE POULTRY BUSINESS.

By C. J. Daniels, Toronto.

This heading might seem strange to some that know Daniels has kept poultry from his youth up. There are two classes that keep poultry, one, that we call the fancier, a very important individual in his line of business, viz., he is all the time breeding up to a standard of perfection by which means we have a far better class of poultry to-day than ever before, our annual shows are great educators to that end. But we cannot all be fanciers and make a success of breeding poultry for exhibition purposes; it takes years and a lot of study to do this.

Everybody can keep a few hens and keep them at a good profit. Only a generation or so ago the hen of commerce was almost unknown. She was allowed or compelled to shift for herself, picking up her living around the barn or house, thus she gained the sobriquet of barn-yard or dung-hill fowl. To-day she bears the world over the proud title of the Canadian Hen, her produce cannot be cornered and the prices controlled or

demoralized by a few to the benefit of themselves and the detriment of others. The poorest of the poor can command as food of her stores as the most powerful potentate.

Now as to what I would do if I were in the poultry business from a mercantile standpoint. I would make a specialty of getting eggs, for I believe there is more profit in eggs than any other branch of the business. First the variety of fowl I would keep. My choice would be between the white or buff Leghorns or Anconas, either of these will outlay any other variety of fowl I know of.

I should have said it is most essential that the birds have a good, comfortable house. If you do not have this you will have no success in getting eggs in winter, when they pay best. I would commence to hatch out my chicks the first of January and to accomplish this a good incubator or incubators, are indispensable, also a good brooder or brooders. By starting in January you will have cockerels you can put on the market by end of March and at tip-top prices before your neighbour has got his chicks out of the shell. Having marketed your males at a good figure, you can turn your attention to your pullets and have them laying by August, and kept at it all winter. One thing certain there is not a red cent in raising late chickens. Just last week a friend of mine (this is November) sent me in twenty late chicks to try and sell for him. I dropped a post-card to a well-known poulterer in town to come up and take them; best he could do for me was twenty-five cents per pair, he had just bought eighty pairs at that price. You will say no money in that. True, but take the other view, the same week I wanted a dozen strictly fresh eggs for a regular customer of mine and I had to send to three places before I could get them, and had to pay thirty cents per dozen for them. Do you see the force of my argument? I had to pay five cents more for a dozen of eggs than what a pair of late chicks fetched. But to get eggs in winter means work. Like the colored brother who stayed in the house and prayed the good Lord to send him some chicken, but his prayer was never answered, but next night he went out and fetched them and got eleven that night

You will have to do your part and go out to the hen house and feed regularly, and see they have plenty of starching stuff on the floor to keep the blood in circulation and plenty of fresh water.

Raising poultry has attained that degree of importance that it is no more sneered at as a wifely occupation. The feeding of poultry has now become almost a science, the old idea was that anything was good enough to feed to the poultry. Now the poultry is fed in a very rational and intelligent way; they are given rations that are known will stimulate egg production without causing them to become too fat. When the object is to fatten the poultry quite a different kind of food is given. Wheat, I have found to be the most profitable food for egg production, although I feed all the grains. In feeding fowls where egg production is the object in view the more varied the feed is the better. Two light meals a day are all that is necessary where the flock has a good range. Recent experiments prove that green cut bone increases the production of eggs to a very large extent. Fowls crave a variety. The allowance of green food, if but a small one, will have a beneficial effect. Cabbage, turnips, cooked or raw, cooked potatoes, cut hay or clover meal, are things much relished by the fowls when in winter quarters

No set rule can be put down how to feed. I have always fed a mash in the morning, summer and winter, not a heavy feed. My neighbour Jones will say he feeds his mash at night. At night I feed whole grain and make them scratch for it.

IS ARTIFICIAL HEAT NECESSARY IN OUR POULTRY HOUSES DURING WINTER?

By A. G. Gilbert, Manager Poultry Department,
Dominion Experimental Farm, Ottawa.

Mr. H. Collingwood, the well-known editor of *The Rural New Yorker*, has written the following letter to me:

"November 24th, 1899.

"Dear Mr. Gilbert,—Do you know of any actual case where hot water or other artificial heat has been successfully used for hens? Of course we understand that this artificial heat is useful for breeding chickens, but I would like to know if it is also useful

for forcing the grown-up birds into laying. One of our readers in Ohio has an idea that he can force winter eggs by keeping his hens in a house thoroughly heated by steam or hot water. I doubt the wisdom of any such attempt, but would really like to know if it has ever been tried, and if so, what the result has been?"

It is made the subject of this paper in order to get the experience of expert poultry keepers and to create discussion. The subject is one of great importance, particularly in portions of our Dominion where the winters are cold and prolonged. The position of affairs seems to be as follows: In certain parts of Ontario and British Columbia the winter temperature is such that the laying hens can run out frequently, or all the time. In such cases artificial heat would not be necessary.

In other portions the cold season begins in December and continues to the middle of March. It is during this period that new laid eggs are high in price and are so because, owing to climatic conditions, difficult to procure. Under such circumstances it does seem as if artificial heat would be an aid. Undoubtedly in some cases it has been used, but in what shape, by how many and with what effect on health of stock and egg production?

How has it been so far? So far experience in the winter housing of hens has been limited, and the practice seems to have been where small flocks of thirty to fifty hens were kept, in a fairly well constructed house, to do without artificial heat, because not required. Farmers in the past have, unfortunately, given but little attention to their poultry. The winter quarters of their hens have been, in the great majority of cases, the least appropriate or convenient. But a change has taken place. We now find poultry keeping recognized as one of the best paying branches of farm work, and the most suitable houses, furnishing, heating, etc., are all live questions of the farmer to-day. But all farmers in the past have not been negligent of their poultry interests. One case not far from here may be mentioned, where the farmer was more of a market gardener than otherwise, but kept poultry. He had a fairly large poultry house, so well constructed that no artificial heat was necessary. In his own words he fed his barred Rocks on "plenty of cabbage and oats, and they shelled out well." In my own case, I had fifteen years ago small houses, grouted with sawdust to the extent of six and four inches. In the house with the six inch sawdust grouting, water never froze in the coldest weather. Not so in the house with the lesser grouting, in which water and droppings froze in low temperatures, perhaps owing to faulty construction, for I was my own carpenter. Air space was not tried. But the houses were too small to be satisfactory.

What is being done at present? At present we find that poultry breeding is being carried on by specialists as well as farmers. The former phase of poultry keeping is carried on by joint stock companies and private individuals. There are several private concerns in the neighborhood of this city and in towns in this locality. The object of these establishments is to obtain eggs in winter and a limited number of early broilers, and later a number of chickens to fatten. Perhaps the most notable enterprise in the shape of joint stock is the Toronto Poultry and Garden Produce Co, situated near Toronto and managed by Mr. J. M. Wilson, an undoubted expert in his line of business. You ask him, "Do you intend to use artificial heat in the houses in which you keep your hens to lay eggs for incubator use in winter?"

"No, sir," he at once replies, "I have scratching sheds attached to the pens in which I keep hens to lay fertile eggs. I want them to have all the fresh air and exercise they can get in the winter months."

"What about your hens, the eggs from which you will sell at winter prices?"

"Ah," he says, "that is a different phase of poultry keeping. The eggs to be sold will not be fertilized and I shall see whether heat is necessary or no."

So it would seem from the above that hens which are to lay fertile eggs with strong germs for incubtor will be better without artificial heat. In the latter case eggs in quantity, without regard to fertility, are wanted and artificial heat may be a means to that end.

But in our locality where the winter temperature, as a rule, is much lower, a scratching room would be preferable to a scratching shed.

Mr. A. S. McBean, a farmer of Lancaster, Ont., who is making a specialty of poultry for broilers and eggs for market, is erecting a new poultry house, in addition to those already in use. He intends to use warm water heat to a limited extent at first. It will be most valuable to have his experience. There are other farmers, who neither time nor

space will permit of mentioning at this time, but whose experience will be most interesting and important to have.

And there is my confrere, the genial and competent manager of the poultry department of that admirable institution, the Ontario Agricultural College at Guelph, Ont., and there is another good authority in F. R. Webber, manager of the Massey Farm Poultry Department.

WHY I BREED ASIATICS.

By A. W. Bell, M.D, Toronto.

To many residents of the cities or towns where ground space is at a premium the keeping of a few fowls becomes, as it were, a pleasure that many cannot indulge themselves in.

Many a small boy refrains from following his propensity for keeping fowls because they are apt to fly over the fence between his father's lot and that of his neighbor, who sits with a gun ready to send the first offending "chicken" that trespasses upon his property into the Great Beyond.

He who raises any of the Asiatic breeds need have no fear of his pets being the recipients of any such deeds, for, with their small wings and large bodies they are unable to fly over the ordinary four foot fence, which makes them so much confined and less expensive, as one does not have to construct such high fences.

Then to the epicure their massive, plump body make a most enjoyable roast when they are killed; in fact they can be passed off when on the table for a turkey.

They are recognized by nearly all poultry experts to be one of the best families for winter laying, at a season of the year when eggs are relished or command a high price, and though to many an egg is an egg whatever kind of a hen laid it, yet one would be surprised when they handle a few Asiatic eggs to notice how heavy they are, indicating that there is so much more substance in one of these than in the smaller hen's egg. Then again, we have the crowing of the male birds, which to nervous people is a great nuisance, especially the shrill, clarion notes of the small bird in comparison with the deep bass voice of the Asiatic.

It is a well known axiom in acoustics that the higher the note or pitch of a voice the more severe it is upon the ear, and thus do we note the great difference between the crow of the large and small birds. This, of course, only refers to city or town lots where the fowls are placed close to the dwellings through necessity. And again, how often does the smaller bird ring out his clarion notes only to be followed by his consort who has laid an egg, which, to hear the noise she makes, you would think was the only one ever laid.

Then, when you wish to show your fowls to your friends you have some size to show, something you need not be ashamed of. Taken altogether the Asiatics are in the estimation of many the beau ideal fowl for the city, but like all others they have their drawbacks, the chief one being their propensity to put on fat, which can be guarded against by judicious feeding.

DRESSED POULTRY IN ITS RELATION TO THE FANCIER.

By Robert H. Essex, Toronto.

The importance of the dressed poultry branch of the industry is very much under estimated; it lies dormant. It is not simply hibernating, but it is dead, or so nearly dead as to give small hopes of its recovery.

We might say it is our duty to lay hold of the matter, but for the present we will let duty sleep for a while and direct our attention to personal interests, which appeal with equal force to us all. Cold, hard cash is the main consideration in these days, and from this standpoint it is possible that I may interest you to such an extent as will impress upon you the desirability of moving in this matter.

The foundation of the poultry business is the consumer—the every day ordinary mortal, who doesn't know a feather from a flag pole, but who is very particular to buy the best dressed and best fattened carcass he can get for his money. The industry has to be built upon the demand he occasions.

You are not so thoughtless as to imagine that the fancier's branch of this great industry is upheld by itself. That would be too much like lifting yourselves by your own boot straps. But I believe you are just so thoughtless as to banish from your mind any consideration of the consequence in a failure in the demand for dead poultry—perhaps for the simple reason that you know such an event will not occur. If it did, no one disputes the fact that the fancier's branch would be dead also—no consumption no demand ; or, as a Chinaman would put it, " No fatty, no fancy."

Every business and profession must cater to a demand, the greater the demand the greater the volume of business ; then, certainly if there is an affinity between consumption of poultry and the volume of business done by the fancier, you will allow that an increase in the consumption results in an increase in the volume of business conducted by the fancier.

The market demand is chiefly supplied by the farmer. A fancier, on the spur of the moment, exclaims that he has no connection with the farmer, and that the farmer's market business does not affect him. I beg to differ.

The increase in the export of cheese has been due, not to naturally increased demand, but to an improvement in the quality of the article which has had the effect of ousting the inferior grades. The quality of the article itself occasioned the increase. So it would be with the poultry industry. The farmer who takes common scrubs to market receives common prices ; whereby, he who has introduced to his stock the thoroughbred blood of some fancier, and thereby increased the size and quality of the fowl, makes a quicker sale and gets a bigger price for his goods.

If the fancier can but impress upon the farmer the truth of this, it would naturally result in an improvement in dressed poultry all around, and there is every reason to believe it would result in increased demand. This would mean additional sales by the fancier, for there would be a proportionately increased demand for the thoroughbred stock.

At the present day poultry is considered a delicacy ; instead of that, it should be made a regular food. How many purchase poultry compared with the number who every day buy beef ? Yet, there is no reason why poultry should not be used to an equal extent. It simply remains with us to impress upon the consumer the little waste there is in poultry, the comparative cheapness compared with other meats, and then supply an object lesson in the shape of an exhibition of dressed fowl.

Antagonists who have not thought the question out may exclaim, " Why do you not exhibit dressed poultry yourself ?" As I have said, personal interests affect us all more or less, and there have not been sufficient inducements for poultrymen to take their time and attention from the breeding of fancy stock and devote it to the exhibition of dressed poultry. The prize money has been so small in the majority of cases. The exhibit, too, is frequently appropriated by the person who gives the prize. How many of you beginners would exhibit at the " Ontario " if the Association confiscated your birds and left you with simply the prize money ? This, of course, is an exaggerated view ; at the same time, what affects us through our best stock affects us also, though perhaps in a less degree, through our culls.

It should be the object to conduct a dressed poultry department in connection with every show. This would be the beginning of an improvement in the business, it would interest the public. Sales could be advertised to be made on certain days, which would attract attention to the advanced quality of stock that had been properly fattened and dressed. Some method of interesting the consumer should be evolved.

Many breeders are these days advertising their stock as prolific egg producers. The day will come when stock will be similarly advertised as breeders of superior market fowls. There is no reason why this should not be done.

Egg production, in individual strains, has been increased by pedigree breeding during the past few years from 120 or 150 eggs per annum to over 200. Selection of suitable breeding stock, and breeding on similar lines, will give you a rapidly maturing fowl, one that may be put into market shape with the least possible feed.

There is no reason why the broiler, which now has a very limited consumption, should not take the place of the matured fowl of to-day, and the matured fowl should be advanced to take its place upon every table alongside the other animal foods.

I wish to impress upon you the following :

1st.—If there is no consumer there will be no fancier. If consumption of poultry increases, the fancier's business increases.

2nd.—If you would increase your business, you must increase the consumption of poultry.

3rd.—Instruction in breeding, fattening, and dressing poultry, is the method to adopt, because improvement in stock invariably increases the demand.

4th.—The most effectual way of doing this is by means of first-class exhibitions of dressed poultry.

5th.—Prizes should be large enough to induce fanciers to fatten their culls and exhibit.

6th.—Auction sales at close of exhibition should be held and should be well advertised.

Finally—Remember if you induce the consumers of one fowl, to consume two, you double your business.

The coming dressed poultry show at London in December suggests to the thoughtful fancier the many occasions upon which the Minister of Agriculture for Ontario has presented to the Ontario Poultry Association his views with reference to market poultry. Go a little deeper, and it evidences the immovable intention of the Government to force ahead the poultry industry—if with the co-operation of the O. P. A., good ; if not, it's a go anyway, and the O. P. A. is the loser. Let me remind the fanciers of Ontario how often the premier Association has been requested to make a specialty of this subject; and, if my memory serves me, inducements were held out by the Department something after this style. The Government grant is not given for the fancy poultry department alone, but with the object of promoting the industry in every possible way. Help the country and the country will help you.

In my judgment it has been clearly stated that the Government grant would be increased as the endeavors of the Association increased. The line of march has been frequently pointed out, but the Association has not seen fit to take that route. Now, then, the Ontario Government takes the bull by the horns and says—the Ontario Association will not do as we suggest, so we will do it ourselves. The result is that $300 or more is voted for a dressed poultry show in connection with the Provincial Fat Stock Show. It is my candid opinion that the Ontario Association could have secured this sum and even more for a similar purpose, but although the idea has been again and again been advanced by a few, it could never be sufficiently impressed upon the directors that to take hold of it would benefit the Association.

Whatever could have been the reason ? Is the show so large that it is undesirable to add to it, or is it beneath the dignity of the " Ontario " to deal with poultry other than alive. The fact is, the Association has been controlled by a few. The majority of members who attend the annual meeting simply sit and watch others act. They offer no suggestions, and are content to vote with the crowd or against it, whichever way their working friends suggest. This inaction has been a dead loss to the Association. The directors should have taken the initiative, if the mass omitted to do so, and if the majority do not wish to exert themselves, it would be wise at least to elect men who will look after their interests. It is questionable whether or not an increased grant can now be obtained ; certainly not without special effort. There is no doubt the government has gone to the base of the industry, and, indirectly, in assisting the fanciers who do not seem to have sufficient foresight to help themselves.

Now, gentlemen, you who intend staying in the business must look to the future. Your profession as fanciers cannot exist unless there is a demand for fancy stock. Who creates this demand ? Get down to business, and think hard and fast. Call to mind the quantity of dressed poultry and the large number of eggs daily marketed in every city. Imagine, if you can, that the demand suddenly ceases and vanishes ; nobody wants dressed fowl nor eggs. Would the huckster continue his rounds ? No, he can make no sales and so does not desire to purchase. Would the farmer continue to breed ? No, for a like reason. He purchases no fowls, he buys no eggs ; then where will the local fancier dispose of his stock ? Very few breed for fun. The fancier in the front rank is at a loss how to dispose of his birds because the local fancier has no use for them. Everybody

goes out of business. It is difficult to imagine such a state of affairs. We are not afraid that it will occur, but I bring it to your notice to impress upon you a theory, which I think will hold water.

The total absence of a market for dressed poultry will indirectly kill the fancier's business. That's right, isn't it? Again, if the entire absence of demand kills business, a reduced demand will simply decrease business. Then if a reduced demand decreases the fancier's business, why, surely, an increased demand increases his business. That is what I want to impress upon you. Make the demand for dressed poultry great, and your business will be similarly affected That's looking to the future, which every solid business man will do. Advance the dressed poultry department; bring the people out to see it; teach them that all dressed poultry is not alike; that there is good, bad and indifferent. Impress it upon them that poultry is cheap, that it should be an every-day food and not merely a luxury. Double the demand for dressed poultry, and where you now sell one bird you will then sell two; where now you make $100 you will then make $200. It remains with the fanciers of Ontario to do this, and the best way to proceed to business is to drum it into the heads of the directors of the Ontario Poultry Association that it must be done. It will be money in your pocket.

THE BANQUET.

The banquet tendered by the Peterboro' Association to the visiting members, was held in the Hotel National on Thursday evening, and was about the best affair of the kind we have attended. The rooms were nicely decorated with flags and flowers, the menu of the choicest, and the toast list not too tedious.

Hon. J. R. STRATTON presided, with Mr. Elezard, M. P. P., on his left and Mayor Kendry on his right. About two hundred sat down; music was supplied by local talent and boutonieres were at every plate.

PRESENTATION TO MR. BROWNE.

Hon. Mr. Stratton had a pleasing duty to perform in the presentation to Mr. Browne, the retiring secretary, of a gold-headed cane and solid gold locket. He read the following address, Mrs. Shales presenting Mr. Browne with the tokens.

To Thos. A. Browne, Esq., Secretary Ontario Poultry Association, London.

Dear Sir,—The members of the Poultry Association of Ontario cannot let this opportunity go by without signifying to you their high appreciation of your services in the office which you now, to their regret, feel compelled to resign. For the past eight years you have filled the secretaryship with a zeal that is commendable and an impartiality that those who know you best cannot fail to honor. In asking you to accept these souvenirs we do so with the hope that your valuable services may not be lost to the Association, but that in another capacity we may look for your advice and assistance.

We can assure you that deep in our hearts lies a strong and lasting friendship for Tom Browne, and that the future will see no abatement of this feeling is our strong desire. Wishing you continued success and long life, we beg to remain your sincere friends, the Poultry Association of Ontario.

Peterboro', Ont., Jan. 11, 1900.

Mr. Browne was taken by surprise, but replied in felicitous terms. He hoped to live long enough so that the staff might be of real help to him, and serve as a reminder of his many friends in the Association.

PRIZE LIST.

List of Prize Winners at the 26th Annual Exhibition of the Poultry Association of Ontario at Peterboro', Ont , January 8 to 12, 1900.

Brahmas—Light.

Cock.—1st, Sage; 2nd, Cox; 3rd, Barker & Muir.
Hen.—1st. Cox; 2nd, Geo. Bogue; 3rd, Daniels.
Cockerel.—1st, Wyatt; 2nd, Cox; 3rd, Lund.
Pullet.—1st, Wyatt; 2nd, Cox; 3rd, Daniels.
Special for cock, Sage.

Brahmas—Dark.

Cock.—1st and 3rd, Garside; 2nd, Sage.
Hen.—1st and 2nd, Sage; 3rd, Garside.
Cockerel.—1st and 2nd, Sage.
Pullet.—1st and 2nd, Sage.
Special for cock (member London Association), Sage.

Cochins—Buff.

Cock.—1st, Wyatt; 2nd, Hare; 3rd, Stewart.
Hen.—1st and 2nd, Stewart; 3rd, Hare.
Cockerel.—1st and 3rd, Stewart; 2nd, Hare.
Pullet.—1st, Wyatt; 2nd, Stewart; 3rd, Hare.
Special for cock, Wyatt.
Special for pair, Stewart.

Cochins—Partridge.

Cock.—1st, A. Bogue; 2nd, Oke; 3rd, Wyatt.
Hen.—1st, A. Bogue; 2nd, Cann & Daniels; 3rd, Wyatt.
Cockerel.—1st, Oke; 2nd, A. Bogue; 3rd, Wyatt.
Pullet.—1st, Oke; 2nd, Wyatt; 3rd, A. Bogue.
Special for cock, A. Bogue.
Special for pair, Oke.

Cochins—Black.

Cock.—1st, McNeil.
Hen.—1st, McNeil.
Cockerel.—1st and 2nd, McNeil.
Pullet.—1st and 2nd, McNeil.
Specials, McNeil.

Cochins—White.

Cock.—1st, 2nd and 3rd, McNeil.
Hen.—1st, 2nd and 3rd, McNeil.
Cockerel.—1st, 2nd and 3rd, McNeil.
Pullet.—1st, 2nd and 3rd, McNeil.
Specials for cock and cockerel, McNeil.

Langshans—Black.

Cock.—1st, Scott; 2nd, McCurdy; 3rd, Dewey.
Hen.—1st, Karn; 2nd, Scott; 3rd, Dewey.
Cockerel.—1st and 3rd, McCurdy; 2nd, Scott.
Pullet.—1st, Scott; 2nd, McCurdy; 3rd, Dewey.
Special for cockerel, McCurdy.

Langshans—A.O.C.

Cock.—1st, Karn.
Hen.—1st, Burn; 2nd, Karn.
Cockerel.—1st, Burn; 2nd, Karn; 3rd, Daniels.
Pullet.—1st, Burn; 2nd, Karn; 3rd, Daniels.
Special for cockerel, Burn.

Plymouth Rocks—Barred.

Cock.—1st, Miller; 2nd, McKay; 3rd, Wright.
Hen.—1st, Miller; 2nd, McKay; 3rd, Trew & Williamson.
Cockerel.—1st and 3rd, Miller; 2nd and 4th, Kedwell.
Pullet.—1st, Miller; 2nd, Jeffrey; 3rd and 4th, McKay.
All specials by Miller (except Farmer special, Wright), cock, hen, cockerel, pullet and the Bertram cup

Plymouth Rocks—White.

Cock.—1st and 2nd, Rice; 3rd, Barker & Muir.
Hen.—1st Elliott; 2nd and 3rd, Rice.
Cockerel.—1st, Barker & Muir; 2nd, Rice; 3rd, Elliott; 4th, Wilson.
Pullet.—1st, Karn; 2nd, Barker & Muir; 3rd, Rice; 4th, Elliott.
Best pair, Barker & Muir.

PLYMOUTH ROCKS—BUFF.

Cock.—1st, Scott ; 2nd, Daniels.
Hen.—1st and 2nd, Scott ; 3rd, Kedwell.
Cockerel.—1st, Hare ; 2nd, Scott ; 3rd, Gallinger Bros.
Pullet. —1st and 2nd, Gallinger Bros.; 3rd and 4th, Hare.
Best pen, Scott.
Best pullet, Gallinger Bros.

WYANDOTTES—GOLDEN.

Cock.—1st, Oldreive ; 2nd, Magill ; 3rd, Daniels.
Hen.—1st and 3rd, Magill ; 2nd, Oldreive.
Cockerel.—1st, Magill ; 2nd, Daniels ; 3rd, Oldrieve.
Pullet.—1st, Oldreive ; 2nd, Magill ; 3rd, Daniels.
Best pair Magill.

WYANDOTTES—SILVER.

Cock.—1st, Geo. Bogue.
Hen —1st, Arthur ; 2nd, Geo. Bogue ; 3rd, Lenton.
Cockerel.—1st, Geo. Bogue ; 2nd and 3rd, Arthur.
Pullet.—1st and 2nd, Arthur ; 3rd, Geo. Bogue.
Best cock or cockerel, Geo. Bogue.
Best pullet, Arthur.

WYANDOTTES—BLACK.

Cock.—1st, Geo. Bogue ; 2nd, Wedgery ; 3rd, Grimsley.
Hen.—1st, Geo. Bogue ; 2nd, Burn ; 3rd, Grimsley.
Cockerel.—1st, Kiley ; 2nd, Geo. Bogue ; 3rd, Oke.
Pullet.—1st, Oke ; 2nd, Burn ; 3rd, Wedgery.
Best pullet, Oke.

WYANDOTTES—BUFF.

Cock.—1st, Mrs. Shales ; 2nd, Field ; 3rd, Cook.
Hen.—1st, Grimsley ; 2nd, Cook ; 3rd, Shales.
Cockerel.—1st, Cook ; 2nd, Shales ; 3rd, Dundas.
Pullet.—1st, Cook ; 2nd, Dundas ; 3rd, Shales.
Best cockerel or pullet by amateur, Geary.

WYANDOTTES—WHITE.

Cock.—1st, Massie ; 2nd, Kettlewell ; 3rd, Shales.
Hen.—1st, Massie ; 2nd, Kettlewell ; 3rd, Shales.
Cockerel.—1st and 2nd, Kettlewell ; 3rd, Shales.
Pullet.—1st, Kettlewell ; 2nd, Shales ; 3rd, Massie.
Best cock, hen, cockerel and pullet, Kettlewell.
Best collection, Kettlewell.
Best pair, Massie.

DOMINIQUES.

Cock.—1st, Fink ; 2nd, Geo. Bogue ; 3rd, Luxton.
Hen.—1st, Geo. Bogue ; 2nd, Fink ; 3rd, Luxton.
Cockerel —1st, Fink ; 2nd and 3rd, Geo. Bogue.
Pullet —1st, Geo. Bogue ; 2nd, Fink ; 3rd, Luxton.

JAVAS—BLACK.

Cock.—1st, Burn ; 2nd, Oke.
Hen.—1st, Daniels ; 2nd, Knight ; 3rd, Oke.
Cockerel.—1st, Oke ; 2nd, Burn ; 3rd, Daniels.
Pullet.—1st, Burn ; 2nd, Daniels ; 3rd, Oke.
Best pair, Burn.

JAVAS—A.O.C.

Cock.—1st and 3rd, Oke ; 2nd, Kiley.
Hen.—1st, Kiley ; 2nd, Oke ; 3rd, Daniels.
Cockerel.—1st, Oke ; 2nd, Daniels.
Pullet.—1st, Oke ; 2nd, Daniels ; 3rd, Kiley.
Best collection, Oke.

LEGHORNS—ROSE COMB, WHITE.

Cock.—1st, Oke ; 2nd, Bell ; 3rd, Stewart & Son.
Hen.—1st, Burn ; 2nd, Bell ; 3rd, Oke.
Cockerel.—1st, Bell ; 2nd, Burn ; 3rd, Oke.
Pullet.—1st, Oke ; 2nd, Bell ; 3rd, Burn.
Best pair White Leghorns, Ramsay.

LEGHORNS—SINGLE COMB, WHITE.

Cock.—1st, Ramsay ; 2nd, Rice ; 3rd, Barker & Muir.
Hen.—1st and 3rd, Ramsay ; 2nd, Rice.
Cockerel.—1st, Rice ; 2nd, Barker & Muir ; 3rd, Graham.
Pullet.—1st, Rice ; 2nd, Ramsay ; 3rd, Graham.

LEGHORNS—SINGLE COMB, BLACK

Cock.—1st, Daniels.
Hen.—1st, Bonnick ; 2nd, Daniels ; 3rd, Knight.
Cockerel.—1st, Bonnick ; 2nd and 3rd, Daniels.
Pullet.—1st and 2nd, Daniels ; 3rd, Bonnick.

LEGHORNS—ROSE COMB, BROWN.

Cock.—1st, Oldreive ; 2nd, Stewart & Son.
Hen.—1st, Stewart & Son ; 2nd, Oldreive.
Cockerel.—1st and 3rd, Oldreive ; 2nd, Stewart & Son.
Pullet.—1st, Colwell.

GEESE—A.O.V., OLD.

Gander.—1st, O'Brien & Colwell ; 2nd, Burn ; 3rd, Stewart & Son.
Goose.—1st, O'Brien & Colwell ; 2nd. Burn ; 3rd, Stewart & Son ; 2nd and 3rd, Oldreive.

LEGHORNS—SINGLE COMB, BROWN.

Cock.—1st and 3rd, Rice ; 2nd, Henderson.
Hen.—1st, Henderson ; 2nd and 3rd, Taylor.
Cockerel.—1st, Rice ; 2nd, Mann ; 3rd, Henderson.
Pullet—1st, Henderson ; 2nd, Rice ; 3rd, Taylor.
Best pair Brown Leghorns, Rice.
Best cockerel, Rice.
Best single comb hen, Henderson.

LEGHORNS—BUFF.

Cock.—Dundas.
Hen.—Dundas.
Cockerel.—Dundas.
Pullet.—Dundas.

BLACK SPANISH.

Cock.—Hare.
Hen.—Hare.
Cockerel.—Hare.
Pullet.—Hare.

MINORCAS—BLACK.

Cock.—1st and 2nd, Minshall ; 3rd, Mrs. Shales.
Hen.—1st and 2nd, Minshall ; 3rd, Stewart & Son.
Cockerel.—1st and 2nd, Minshall ; 3rd, Stewart & Son.
Pullet.—1st, 2nd and 3rd, Minshall.

ANDALUSIANS.

Cock.—1st, Junkin ; 2nd and 3rd, Cosh.
Hen.—1st and 2nd, Cosh ; 3rd, Knight.
Cockerel.—1st and 2nd, Cosh ; 3rd, Knight.
Pullet.—1st, Knight ; 2nd and 3rd, Cosh.
Best pair, Cosh.
Best cockerel or pullet, London exhibitors, Milton & Michelltree.

HAMBURGS—GOLDEN SPANGLED

Cock.—1st, Oke ; 2nd, McNeil.
Hen.—1st, McNeil ; 2nd, Oke.
Cockerel.—1st, McNeil ; 2nd, Bogue ; 3rd, Oke.
Pullet.—1st, McNeil ; 2nd, Oke.
Best pair, any kind, Hamburgs, McNeil.
Best spangled, McNeil.

HAMBURGS—SILVER SPANGLED

Cock.—1st, McNeil ; 2nd, Bogue ; 3rd, Oke.
Hen.—1st, McNeil ; 2nd, Oke ; 3rd, Bogue.
Cockerel.—1st, McNeil ; 2nd, Oke ; 3rd, Stewart & Son.
Pullet.—1st, McNeil ; 3nd, Oke ; 3rd, Bogue.

HAMBURGS—GOLDEN PENCILLED.

Cock.—1st, Bogue ; 2nd, Oke ; 3rd, McNeil.
Hen.—1st, McNeil ; 2nd, Oke.
Cockerel.—1st, Oke ; 2nd, McNeil.
Pullet.—1st, Oke ; 2nd, McNeil.
Best pencilled Hamburgs, Oke.

HAMBURGS—SILVER PENCILLED

Cock.—1st, Bogue ; 2nd, McNeil ; 3rd, Oke.
Hen.—1st, Oke.
Cockerel.—1st, McNeil ; 2nd, Bogue ; 3rd, Oke.
Pullet.—1st, McNeil ; 2nd, Oke ; 3rd, Bogue.

BLACK HAMBURGS

Cock.—1st, McNeil ; 2nd, Oke.
Hen.—1st, Oke ; 2nd, McNeil.
Cockerel.—1st, McNeil ; 2nd, Oke.
Pullet.—1st, McNeil ; 2nd, Oke.
Best black Hamburgs, McNeil.

RED CAPS.

Cock.—1st and 3rd, Daniels ; 2nd, Stewart & Son.
Hen.—1st, Stewart & Son ; 2nd and 3rd, Daniels.
Cockerel.—1st, Daniels ; 2nd, Stewart & Son.
Pullet.—1st, Daniels.

GAMES—BLACK RED.

Cock.—1st, Oldrieve ; 2nd, Barber ; 3rd, Geoghegan.
Hen.—1st, Barber ; 2nd, Oldrieve ; 3rd, Geoghegan.
Cockerel.—1st, Field ; 2nd, Oldrieve ; 3rd, Barber.
Pullet.—1st, Barber ; 2nd, Field.
Best pair, Barber.

GAMES—BROWN RED.

Cock.—1st, Barber ; 2nd, Oldrieve ; 3rd, O'Brien & Colwell.
Hen.—1st, Oldrieve ; 2nd, Barber.
Cockerel.—1st, Barber.
Pullet.—1st, Barber ; 2nd, O'Brien & Colwell.

GAMES—DUCKWING.

Cock.—1st, Barber ; 2nd, O'Brien & Colwell ; 3rd, Oldrieve.
Hen.—1st, Barber ; 2nd, O'Brien & Colwell ; 3rd, Oldrieve.
Cockerel.—1st, Barber.
Pullet.—1st, Barber.

GAMES—PYLE.

Cock.—1st, O'Brien & Colwell ; 2nd, Barber.
Hen.—1st, Barber.
Cockerel.—1st and 3rd, Sherlock ; 2nd, Barber.
Pullet.—1st and 2nd, Sherlock ; 3rd, Barber.
Best pullet, Sherlock.

GAMES—INDIAN.

Cock.—1st, Robinson ; 2nd, Parsons ; 3rd, O'Brien & Colwell.
Hen.—1st and 2nd, Parsons ; 3rd, Robinson.
Cockerel.—1st, Robinson ; 2nd and 3rd, Parsons.
Pullet.—1st, Robinson ; 2nd and 3rd, Parsons.
Best pair, best cock, best pullet, Robinson.

GAMES—A.O.S.V.

Cock.—1st, Daniels ; 2nd, Burn ; 3rd, Parsons.
Hen.—1st, Daniels ; 2nd, Burn ; 3rd, Parsons
Cockerel.—1st, Burn ; 2nd, Daniels ; 3rd, Bogue.
Pullet.—1st, Daniels ; 2nd, G. Bogue ; 3rd, Burn.

GAME BANTAM—BLACK RED.

Cock.—1st, Oldrieve ; 2nd, Kedwell.
Hen.—1st, Turville ; 2nd, Oldrieve ; 3rd, Kedwell.
Cockerel.—1st, Turville ; 2nd, Wright.
Pullet.—1st, Turville ; 2nd, Wright.
Special for hen, Turville.

GAME BANTAM—BROWN RED.

Cock.—1st, Turville ; 2nd, Oldrieve ; 3rd, Bonnick.
Hen.—1st, Turville ; 2nd, Oldrieve ; 3rd, Bonnick.
Cockerel.—1st, Oldrieve ; 2nd. Turville ; 3rd, Bonnick.
Pullet.—1st, Oldrieve ; 2nd, Turville ; 3rd, Bonnick.

GAME BANTAMS—DUCKWING.

Cock.—1st, Turville ; 2nd, Oldreive.
Hen.—1st, Barber ; 2nd, Turville ; 3rd, Oldreive.
Cockerel.—1st, Turville ; 2nd, Barber.
Pullet.—1st, Barber ; 2nd, Turville.
Special for male, Turville.

BANTAMS—PYLE.

Hen.—1st, Barber ; 2nd, Mitchelltree.
Cockerel.—1st, Barber.
Pullet.—1st, Barber ; 2nd, Mitcheltree.
Special for hen, Barber.

BANTAMS—A.O.V.

Cock.—1st and 2nd, Donovan.
Hen.—1st and 2nd, Donovan ; 3rd, Keiley.
Cockerel.—1st and 2nd, Donovan.
Pullet.—1st and 2nd, Donovan.

BANTAMS—GOLDEN SEBBIGHT.

Cock.—1st, Oke ; 2nd, McNeil.
Hen.—1st McNeil ; 2nd, Oke.
Cockerel.—1st McNeil; 2nd, Oke.
Pullet.—1st, Oke ; 2nd, McNeil ; 3rd, Kedwell.
Collection—Oke.

SILVER SEBRIGHT.

Cock.—1st, McNeil ; 2nd, Oke.
Hen.—1st, McNeil ; 2nd, Oke ; 3rd, White.
Cockerel.—1st, McNeil ; 2nd, Oke ; 3rd, White.
Pullet.—1st, Oke ; 2nd, McNeil.
Special.—McNeil.

ROSE COMB—WHITE OR BLACK.

Cock.—1st, Oke ; 2nd, McNeil ; 3rd, Oldrieve.
Hen.—1st, Oke ; 2nd, McNeil ; 3rd, Oldrieve.
Cockerel.—1st, McNeil ; 2nd, Oke ; 3rd, Oldrieve.
Pullet.—1st, McNeil ; 2nd, Oke ; 3rd, Oldrieve.
Special, Black Rose Comb Cockerel.—McNeil.

COCHIN—WHITE.

Cock.—1st and 3rd, McNeil ; 2nd, Donovan.
Hen.—1st, McNeil ; 2nd, Keiley ; 3rd, Donovan.
Cockerel.—1st, McNeil ; 2nd, Donovan ; 3rd, McNeil.
Pullet.—1st and 2nd, McNeil ; 3rd, Rankin Bros.
Special, Collection of White.—McNeil.

COCHIN—BUFF.

Cock.—1st, McNeil ; 2nd, Oke ; 3rd, Donovan.
Hen.—1st, McNeil ; 2nd, Oke ; 3rd, Donovan.
Cockerel.—1st, McNeil ; 2nd, Oke ; 3rd, Bonnick.
Pullet.—1st, McNeil ; 2nd, Bonnick ; 3rd, Oke.
Special, pair.—McNeil.

COCHIN—A.O.V.

Cock.—1st, Moore ; 2nd, Kelley.
Hen.—1st, Keiley ; 2nd, Moore ; 3rd, Donovan.
Cockerel.—1st, Keiley ; 2nd, Rankin Bros. ; 3rd, Moore.
Pullet.—1st, Keiley ; 2nd, Moore ; 3rd, Donovan.

COCHINS—BLACK.

Special, Collection.—Keiley.

BOOTED—WHITE.

Cock.—1st, Oke.
Hen.—1st and 2nd, Oke ; 3rd, Keiley.
Cockerel.—1st and 2nd, Oke.
Pullet.—1st and 2nd, Oke.
Collection.—Oke.

JAPANESE—BLACK-TAILED.

Cock.—1st, Oke ; 2nd, McNeil.
Hen.—1st, McNeil ; 2nd, Oke.
Cockerel.—1st, McNeil ; 2nd Oke.
Pullet.—1st, McNeil ; 2nd, Oke.
Collection, McNeil.

POLISH.

Cock.—1st, Oke ; 2nd, McNeil ; 3rd, Donovan.
Hen.—1st, McNeil ; 2nd, Donovan ; 3rd, Oke.
Cockerel.—1st, McNeil ; 2nd, Donovan ; 3rd, Oke.
Pullet —1st, Donovan ; 2nd, McNeil ; 3rd, Oke.
Collection, McNeil.

A. O. V.

Cock.—1st, McNeil ; 2nd, Donovan ; 3rd, Oke.
Hen.—1st, Oke ; 2nd. McNeil ; 3rd, Donovan.
Cockerel.—1st, Oke ; 2nd. McNeil ; 3rd, Donovan.
Pullet.—1st and 2nd, Donovan ; 3rd, McNeil.

DORKINGS—SILVER GREY.

Cock.—1st, Cox ; 2nd, Lean.
Hen.—1st, Bogue ; 2nd and 3rd, Cox.
Cockerel.—1st, Bogue ; 2nd, Cox ; 3rd, Lean.
Pullet.—1st, Bogue ; 2nd, Lean ; 3rd, Cox.
Special, Bogue.

DORKINGS—COLORED.

Cock.—1st, Bogue.
Hen.—1st, Bogue.
Cockerel.—1st, Bogue.
Pullet.—1st, Bogue.

DORKINGS—WHITE.

Cock.—1st and 2nd, Bogue.
Hen.—1st and 2nd, Bogue.
Cockerel.—1st Bogue; 2nd, Holton; 3rd, Bogue.
Pullet.—1st, Holton; 2nd and 3rd, Bogue.
Special, Bogue.

POLANDS—W. C. B.

Cock.—1st, Bogue; 2nd, McNeil; 3rd, Wright.
Hen.—1st, Bogue; 2nd, McNeil; 3rd, Wright.
Cockerel.—1st, McNeil; 2nd, Wright; 3rd, Bogue.
Pullet.—1st, Bogue; 2nd, McNeil; 3rd, Wright.
Special, cock, Bogue.

GOLDEN—UNBEARDED.

Cock.—1st, McNeil; 2nd, Bogue.
Hen.—1st, Bogue; 2nd, McNeil.
Cockerel.—1st, McNeil; 2nd, Bogue.
Pullet.—1st, McNeil; 2nd, Bogue.

SILVER—UNBEARDED.

Cock.—1st, Burn; 2nd, Burn.
Hen.—1st, Burn; 2nd, Burn.
Cockerel.—1st, Burn.
Pullet.—1st, Burn.
Collection, Burn.

WHITE—UNBEARDED.

Cock.—1st, Bogue; 2nd McNeil.
Hen.—1st, Bogue; 2nd McNeil.
Cockerel.—1st, McNeil; 2nd, Bogue.
Pullet.—1st, McNeil; 2nd, Bogue.

GOLDEN—BEARDED.

Cock.—1st, Bogue; 2nd, McNeil.
Hen.—1st, McNeil; 2nd, Bogue.
Cockerel.—1st, Bogue; 2nd, McNeil.
Pullet.—1st, McNeil; 2nd, Bogue.

SILVER—BEARDED.

Cock.—1st, Bogue; 2nd, McNeil.
Hen.—1st, Bogue; 2nd, McNeil.
Cockerel.—1st, McNeil; 2nd, Bogue.
Pullet.—1st, Bogue; 2nd, McNeil.

WHITE—BEARDED.

Cock.—1st, McNeil; 2nd, Bogue.
Hen.—1st, McNeil; 2nd, Bogue.
Cockerel.—1st, McNeil; 2nd, Bogue.
Pullet.—1st, McNeil.

BUFF—LACED.

Cock, hen, cockerel and pullet.—1st and 2nd, all McNeil.
Collection, McNeil.

HOUDANS.

Cock.—1st and 3rd, Trew & Williamson; 2nd, Bogue.
Hen.—1st, Bogue; 2nd and 3rd, Trew & Williamson.
Cockerel.—1st and 3rd, Trew & Williamson; 2nd, Bogue.
Pullet.—1st, Bogue; 2nd and 3rd, Trew & Williamson.
Special, cock, Trew & Williamson.
Pair, Bogue.

CREVE CEOURS.

Cock, hen, cockerel and pullet.—1st, all Oke.
Special, cockerel, Oke.

LA FLECHE.

Cock, hen, cockerel and pullet.—1st and 2nd, all Oke.

SULTANS.

Cock, hen, cockerel and pullet.—1st and 2nd, all Oke.

ORPINGTONS.

Cock and hen.—1st and 2nd, Chambers.
Cockerel.—1st and 3rd, Chambers; 2nd Stone.
Pullet.—1st and 2nd, Chambers; 3rd, Stone.
Special, pair, Chambers.

A. O. V. FOWLS.

Cock.—1st, McNeil; 2nd, Donovan; 3rd, Daniels.
Hen.—1st, McNeil; 2nd, Daniels; 3rd, Donovan.
Cockerel.—1st, McNeil; 2nd, Donovan; 3rd, Daniels.
Pullet.—1st, McNeil; 2nd, Daniels; 3rd, McNeil.

BRONZE TURKEYS—TWO YEARS OLD AND UP.

Cock.—1st, Stewart & Sons; 2nd, Beattie.
Hen. 1st and 2nd Beattie; 3rd, Bell.
Special, hen, Beattie.

BRONZE TURKEYS—ONE YEAR AND UNDER TWO

Cock.—1st, Beattie: 2nd, Bell.
Hen.—1st, Beattie; 2nd, Bell.

BRONZE TURKEYS OF 1899.

Cock.—1st, Beattie; 2nd, Bell; 3rd, Lean.
Hen.—1st, Beattie; 2nd, Bell.

WHITE OR BLACK, OLD.

Cock.—1st and 2nd, Beattie.
Hen.—1st, Beattie.

WHITE OR BLACK, OF 1899.

Cock.—1st, O'Brien & Colwell; 2nd and 3rd, Beattie.
Hen.—1st, O'Brien & Colwell; 2nd and 3rd. Beattie.

A. O.V. OLD.

Cock.—1st, Beattie; 2nd, Luxton.
Hen.—1st, Beattie: 2nd, Luxton.

A O.V. OF 1899.

Cock.—1st, Beattie; 2nd, Luxton.
Hen.—1st, Beattie; 2nd, Luxton.

TOULOUSE GEESE, OLD.

Gander.—1st, A. Bogue; 2nd and 3rd, O'Brien & Colwell.
Goose.—1st and 3rd, O'Brien & Colwell; 2nd. Bogue.
Special pair, any kind.—O Brien & Colwell.

TOULOUSE GEESE OF 1899.

Gander.—1st and 2nd, O'Brien & Colwell.
Goose.—1st and 2nd, O'Brien & Colwell.

BREMEN, OLD.

Gander.—1st and 2nd, O'Brien & Colwell.
Goose.—1st and 2nd, O'Brien & Colwell.

BREMEN OF 1899.

Gander.—1st and 2nd, O'Brien & Colwell.
Goose.—1st and 2nd, O'Brien & Colwell; 3rd, Stewart & Son.

BREMEN OF 1899.

Gander.—1st, O'Brien & Colwell; 2nd, Burn.
Goose.—1st, O'Brien & Colwell; 2nd, Burn.

AYLESBURY DUCKS—OLD.

Drake.—1st, A. Bogue; 2nd, O'Brien & Colwell; 3rd, Stewart & Son.
Duck.—1st, O'Brien & Colwell; 2nd. A. Bogue; 3rd, Knight.
Special, pair of any kind, A. Bogue.

AYLESBURY—1899.

Drake.—1st, A. Bogue: 2nd and 3rd, O'Brien & Colwell.
Duck.—1st, A. Bogue: 2nd and 3rd, O'Brien & Colwell.

ROUEN DUCKS—OLD.

Drake.—1st and 2nd, O'Brien & Colwell; 3rd, A. Bogue.
Duck.—1st and 3rd, O'Brien & Colwell; 2nd, Knight.

ROUEN DUCKS—1899.

Drake.—1st and 2nd, O'Brien & Colwell: 3rd. A. Bogue.
Duck.—1st, Bogue: 2nd and 3rd, O'Brien & Colwell.

PEKIN DUCKS—OLD.

Drake.—1st, A. Bogue; 2nd and 3rd, O'Brien & Colwell.
Duck.—1st, A. Bogue; 2nd and 3rd, O'Brien & Colwell.

PEKIN—1899.

Drake.—1st and 2nd, O'Brien & Colwell; 3rd, Wright.
Duck.—1st, Karn; 2nd, A. Bogue; 3rd, O'Brien & Colwell.

A. O. V. DUCKS—OLD.

Drake.—1st, Geo. Bogue; 2nd, Burn; 3rd, Daniels.
Duck.—1st, Geo. Bogue; 2nd, Daniels; 3rd, Luxton.

A. O. V. Ducks—1899.

Drake.—1st, Burn ; 2nd, Geo. Bogue ; 3rd, Luxton.
Duck.—1st, Geo. Bogue ; 2nd, Luxton.

Dressed fowl, 1st and 2nd, Parsons ; 3rd, McKay.
Special, geese, McKay.
Display of dressed poultry, McKay.
Eggs, best and heaviest, 1st, McCurdy ; special, McCurdy.

Pheasants.

English.—1st, Burn ; 2nd and 3rd, Wright.
Golden.—1st, Burn.
Silver.—1st, Burn.
A. O. V.—1st, Burn.
Best collection, Burn.

Specials.

Best barred Plymouth Rock cock, hen, cockerel and pullet, G W. Millar.
Best pair of fowl shown, McNeil.
White Wyandotte cock, hen, cockerel and pullet, Kettlewell.
Pen Asiatic fowl, McNeil.
Best display in American class, Miller.
Breeding pen of barred Rocks, Miller.
Best collection of one variety in American, Asiatic or Mediterranean classes, McNeil.

CONSTITUTION AND BY-LAWS OF THE POULTRY ASSOCIATION OF ONTARIO.

Constitution.

Section 1. The object of this Association is to encourage the interest and to promote improvement in the breeding and the management of poultry and pet stock by means of exhibitions, the collecting and disseminating of reliable and practical information relating thereto.

2. Officers. The officers of this Association shall consist of a president, two vice-presidents and nine directors, the same to be elected at the annual meeting, seven of whom shall form a quorum for the transaction of business.

3. Membership. Any person on the payment of $1 becomes a member of this Association for the term of one year, said fee to be paid to the secretary on or before the day of annual meeting.

4. Voting. None but duly qualified members of this Association are allowed to vote ; all questions shall be decided by vote, either by ballot or otherwise as decided by meeting.

5. Meeting. The annual meeting of this Association shall be held at 1.30 p.m. on Thursday of the same week, in the same town or city, in which the annual exhibition is held.

6. Special meeting. Special meetings of this Association shall be called by the president, and notice shall be sent to each director through the post office, specifying the object of such meeting at least eight days before the day appointed for holding same.

7. Auditor—One or more auditors shall be elected at the annual meeting of this Association each year.

By-Laws.

Section 1, clause 1. The president shall preside at all meetings of the Association and board meetings, and shall decide all questions of order subject to the right of appeal.

Clause 2. He shall enforce order and decorum at all meetings and see that all by-laws and resolutions of the Association are properly carried out.

Clause 3. He shall be *ex-officio* member of all committees with power to vote.

Section 2, clause 4. The 1st vice-president shall in the absence of the president have the powers and assume the duties of the president.

Clause 5. The 2nd vice-president shall in the absence of the president and 1st vice-president have the powers and assume the duties of president.

Clause 6. In the absence of the president and the 1st and 2nd vice-presidents, the members may appoint one of their number to preside.

Section 3, clause 7. It shall be the duty of the secretary to keep a correct record of the proceedings of the annual and all board meetings, to have charge of all books and documents belonging to the Association and to carefully preserve the same.

Clause 8. He shall conduct all correspondence of the Association subject to the order of the president.

Clause 9. He shall receive all membership and entry fees, handing same over to treasurer as soon as practicable.

Clause 10. He shall forward to the auditors all books and papers of this Association under his care on or before August 1st of each year.

Clause 11. He shall make out two reports to be sent to the Minister of Agriculture as prescribed in section 9 and 10 of the Act of incorporation of the Poultry Association of Ontario

Section 4, clause 12. The treasurer shall receive all funds belonging to the Association, all payments being made direct to him, except membership and entrance fees which may be received by secretary, but which are to be handed to treasurer as soon as practicable.

Clause 13. He shall pay all bills, accounts, awards, etc., contracted by the Assocation, per order of the president, countersigned by the secretary.

Clause 14. He shall present a complete statement of his accounts at each annual meeting, or oftener if required, and shall perform such other duties as may be required by the board.

Clause 15. He shall forward to the auditors all books and papers of the Association under his care on before August 1st of each year.

Clause 16. For the proper performance of his duties bonds to the extent of $1,000 shall be procured from a company or bondsmen satisfactory to the board.

Section 5, clause 17. Meeting called to order.
Reading minutes of last annual meeting and board meetings.
Secretary's report.
Treasurer's report.
Auditors' report.
Reports of special committees.
Deciding on place for next exhibition.
The election of officers.
The election of auditors.
Miscellaneous business.

Section 6, clause 18. No by-law of this Association shall be repealed, amended or added to except on a vote of two-thirds of the members present at the annual meeting.

Rules and Regulations Governing the Annual Exhibition.

The Annual Exhibition shall be held the 2nd full week in January of each year.

The Annual Meeting of the Association shall be held in , at 1.30 o'clock in the afternoon of Thursday, January , for the election of officers and general business.

The Exhibition will be open to the public on Tuesday, the of January. , at 2 o'clock p.m., and will be open daily from 9 o'clock a.m. to 10 o'clock p.m., closing at 12 o'clock noon on Friday, of January,

No person will be admitted to the Exhibition previous to this opening, except those who are actually engaged in the arrangements.

Exhibitors may coop their own birds.

All specimens for competition must be the bona fide property of the exhibitor. The discovery of any false statement, whether of age or proprietorship, will exclude the entry from competition, if discovered in time, and if not the premium will be withheld.

During the continuance of the Exhibition all specimens are to be under the full control of the Association. No birds will be allowed in the show except those entered for competition. Specimens cannot be removed except by consent of the President, which consent will only be given when required for sanitary reasons. All eggs laid during the period in which the fowl are in possession of the Association will be gathered and their vitality destroyed.

All Exhibitors Must Become Members. Members' tickets, $1.00, which will admit members during the Exhibition, and are not transferable.

All entries must be made on printed forms, to be furnished by the Secretary of the Association, and signed by the exhibitor or his agent.

All entries to be in single birds, except where otherwise mentioned. Entrance fees include feed and attendance.

No separate entry required for specials, except where the section or varieties are not mentioned in the Prize List proper.

Entry and membership fees must be remitted to the Secretary for all departments, with entry form, otherwise they will be returned. Entry papers will not be accepted or alterations made after Tuesday, January . This is Imperative.

Where an exhibitor is showing two or more specimens of the same variety, age and sex, leg bands should be put on to distinguish them. (It would be well to have them on every bird.)

Entry tickets will not be mailed to exhibitors, but will be taken to the show by the Secretary.

All specimens must be delivered to the Exhibition Hall of the Association, which will be open for their reception from the morning of Monday, the of January, , at 10 o'clock; and all specimens not received at 12 o'clock noon on Tuesday, the of January, , will be debarred from competition, unless detained by unavoidable delay, in which case they may be admitted at the discretion of the directors.

Exhibitors from a distance may send their birds direct to the Exhibition room, where they will be received by the Superintendent, properly cared for during the Exhibition, and at its close properly returned or otherwise disposed of, as the owner may direct. All shipping coops may have the sender's name painted on for the return journey. Exhibitors must pay all transportation expenses.

The Association will not be responsible for any loss or damage from whatsoever cause arising, the birds being at the sole risk of the exhibitors.

Exhibitors not accompanying their birds must send them as they wish them arranged for exhibition, or if more than one bird be sent in a coop they must be marked so that the Superintendent can place them properly in the Association's coops for exhibition.

Coops will be furnished for all except Pigeons, Cage Birds and Pet Stock.

Judges will commence at 1 p.m. on Tuesday, and complete their work as early as possible.

Exhibitors desiring to have their birds scored may arrange with any of the judges engaged by the Association to do so after the judge has completed his regular duties (not before). The judge to supply the score card and collect a fee of ten cents for each bird he scores, and that this be included in the arrangements with the judges when accepting their positions.

Judging will be by comparison.

Protests must be made in WRITING, and be delivered to the Secretary WITHIN TEN HOURS OF THE CAUSE OF PROTEST; it must state plainly the case of complaint or appeal, and must be accompanied by a deposit of $2.00, which will be forfeited to the Association if the said protest is not sustained. The Board of Directors, however, earnestly hope that exhibitors will not enter protest without the strongest grounds for so doing, as much annoyance and unpleasantness is often occasioned by protests of a frivolous nature.

Prizes will be paid by cheque at the Secretary's office in the Show Room, between 9 and 10 o'clock a.m. on the last day of show.

Exhibitors are particularly requested to apply for their premiums on the above date, or give a written order to some person to receive same.

EASTERN ONTARIO POULTRY ASSOCIATION.

REPORT OF THE SECRETARY.

I have the honor to submit the annual report of the Eastern Ontario Poultry Association. The exhibition this year was held at Ottawa, an interval of four years having elapsed since the holding of the last exhibition there.

The exhibits were all that could be desired in quality and sufficient in quantity, there being about a thousand birds in the show; and, as usually happens at the Eastern Ontario exhibitions, the fowls in the practical classes far outnumbered those in the ornamental. One of the most hopeful signs among the poultry breeders is the desire to develop poultry which, while fit to compete in the show pen, also possess those practically useful qualities that commend a fowl to the ordinary farmer, even so devoted a breeder of fancy poultry as Mr. W. McNeil, of London, being most anxious to impress upon his hearers at the annual meeting of the Ontario Poultry Association that he had had a white Cochin pullet that had begun laying at four months and eight days old. The result is that in the varieties of fowl that are suitable for the farmer and poultryman competition is very keen. It is noticeable, too, that the number of farmer exhibitors is increasing, while they are, I am glad to say, successful in taking off far more than their share of the prizes. In my opinion, the success of the poultry industry in Canada will not depend upon the successful establishment of large poultry farms, but upon educating the farmer to improve his stock, and also, and particularly, in inducing persons living in the suburbs of the cities and towns to go into poultry-keeping. On the continent of Europe the supply of poultry is dependent upon the small farmers who keep moderate-sized flocks of fowls, the produce of which is from time to time taken to market centers.

In Great Britain the same is also true, with the exception that poultry fattening is a separate business, the poultry being collected from the small raisers and fattened by men who make a specialty of the business.

This mode of conducting the poultry business is also correct in theory. Small flocks can be raised much more economically than large ones; there is practically no expense for labor, the food is largely what would otherwise be waste, and the outlay for buildings is reduced to a minimum.

As, with the development of the country, the struggle for a living gets more intense in Canada, it will become more and more necessary to reduce the waste—waste of labor and waste of food; the keeping of poultry will use up spare minutes and also the food scraps.

It is here that the work of Poultry Associations becomes invaluable—by the annual exhibitions and by the private work and conversation of each member of every association.

Everyone who keeps and exhibits poultry knows how numerous the visitors are that he has coming to see his stock and learn his methods, especially if he has a reputation of being a successful exhibitor. It is in this way that the exhibitions perform one of their most valuable functions.

A very valuable move has been made during the past year by many exhibitions in creating novice classes, where new exhibitors are encouraged, and where they need not fear the competition of experts. I trust that the Eastern Ontario Association will next year have a number of novice classes, and will also deal with that very important question, dressed poultry.

I believe that the dressed poultry exhibition in connection with the Fat Stock show was not the success that was anticipated. I would suggest that the Government assistance given to the Fat Stock show for that purpose should be given in turn to the various Poultry

Associations in Ontario, so that it may serve as an object lesson to the poultry raisers throughout the whole extent of the Province. At the coming exhibition at Almonte, a manufacturing town, where large quantities of poultry must be consumed, I hope a special effort may be made to get a good exhibit of dressed poultry, and that prizes be given for good carcases and also for the most attractively dressed birds.

At a recent exhibition I saw some otherwise fine poultry dressed in a most unattractive—I was almost going to say disgusting—manner, with skewers so placed as to injure choice portions of the birds, showing how necessary a little education is in this regard. It is most important that poultry should not only be raised of the best possible kind, but also that it should be prepared for the market in the best possible way. Some time since I saw at the Ottawa market a farmer selling a pile of poultry that had been put in a barrel and allowed to freeze. He had had to cut the barrel hoops and pull off the staves in order to get the birds, which were all curved and contorted. That man had thrown away so much money, for his poultry had to be sold at a very reduced rate to find purchasers, and even then sold slowly. That, no doubt, was an extreme case, but I never yet went to the market that I did not see poultry reduced in value by unskilful dressing.

One of the greatest difficulties all Poultry Associations meet with is to secure a large attendance at the exhibitions, and an attendance of those whom it is desired to interest in poultry. Last year at Brockville the attendance was excellent, but this year the attendance was small; the same is true of the Ontario exhibition at Peterborough, while I see that at Petrolea the gate receipts were under thirteen dollars. Some years ago I advocated free admission, but this was objected to upon the grounds that the show would be so crowded that it would be impossible to protect the exhibits, and also that it would be crowded with the wrong people, namely, those who had no intention of taking any interest in poultry. I certainly would advocate reducing the entry fee to, say, ten cents and setting apart a portion of each day, or of certain selected days, for free admission to farmers and their wives. The next exhibition is to be held at Almonte, and I think it highly probable that there the attendance will be all that can be desired; but in the near future the old question of securing a good attendance will rise again, and it appears to me of primary importance to try every means to secure a larger attendance and so a larger sphere for doing the important work entrusted to us.

Owing to the generosity of the Government in making a special grant to the Association for coops, this year, for the first time, we were able to entirely dispense with any temporary coops. Two hundred wire coops were received just in time for the exhibition, while the fifty wire turkey coops received just too late for the last exhibition were also available. These, with the two hundred wire bantam coops and the old wooden folding coops, enabled the Superintendent, Mr. W. Gray, to arrange the exhibition in a most attractive manner. I trust that the Association will soon be able to afford to buy a couple of hundred more wire coops, so that the cooping may be uniform throughout the show. The saving of time, trouble and expense by having the new coops can only be appreciated by those who have managed the shows in years past, but the improved appearance of the show could be appreciated by anyone.

The Association is under a deep debt of gratitude to His Excellency the Governor-General, who most kindly paid the exhibition a visit, and appeared much interested in some of the varieties of fowl exhibited.

I have the honor to be, Sir,

Your obedient servant,

FRANCIS H. GISBORNE,

Secretary-Treasurer.

Ottawa, January, 1900.

EASTERN ONTARIO POULTRY ASSOCIATION.

OFFICERS FOR 1900.

President.....F. J. BLAKE .....Almonte.
1st Vice-President .....G. S. OLDRIEVE.....Kingston.
2nd Vice-President.....J. C. SMITH .....Hintonburg.
Secretary-Treasurer .....A. P. MUTCHMOR.....Ottawa.
Directors :
Division No. 1.....W. M. OSBORNE .....Brockville.
Division No. 2.....C. J. DEVLIN .....Ottawa.
Division No. 3.....W. M. BAILLIE .....Kingston.
Division No. 4.....Mrs. GEORGE C. HOLLAND .....Ottawa West.
Auditor .....GEORGE L. BLATCH .....Ottawa.

MEMBERS FOR 1900.

Name.	Post Office.	Varieties exhibited.
Fraser, A. A.....	Sandringham	Barred Plymouth Rocks, Black Minorcas.
Cole, John.....	Hamilton., ...	Light Brahmas.
Graham, S. N.....	Kingston..... ...	White and Buff Leghorns, C. Indian Game.
Oldrieve, G. S.....	"	Golden Wyandottes, R. C. Brown Leghorns, Games and Game Sebright and Black African Bantams.
Magill, J. H.....	Port Hope	Golden Wyandottes, Pouter Pigeons.
Baillie, Wm.....	Kingston.....	Langshans, White P. Rocks, Buff Wyandottes, Buff Cochin Bantams.
Garland, W. F.	Hintonburg	Langshans, Barred and White P. Rocks, Black Minorcas, White Leghorns, Sebright Bantams.
O'Toole & Noel.....	Ottawa...	Pigeons.
Nantel, W. B.	St. Jerome, Que.....	Brahmas, Cochins, Cochin Bantams.
Frith, E. R.....	Maxville	Black Minorcas.
Eves, W. H..	Kingston	Javas, Golden Wyandottes, Brown Leghorns, Single and Rose Combed.
Thompson, A.....	Allan's Corners, Que.	Turkeys, ducks and geese. White P. Rocks.
Stewart, W. & Son	Menie.....	L. Brahmas, Dorkings, B. Minorcas, White and Brown Leghorns, Indian Games, Hamburgs, Poland Houdans, Red Caps, Sebright Bantams, Turkeys, Ducks and Geese.
Harmer, Mrs. E.....	Westboro	Silver Wyandottes.
Murphy, E. F.....	Ottawa.....	Black Hamburgs, R. C. Black Bantams.
Benjamin, E. H.....	Ottawa.....	Pit Games, Buff P. Rocks.
Gray, W. F.....	Ottawa	White Plymouth Rocks.
Mills, Jas. A.	Ottawa..... .	Brown Leghorns.
Neilson, J. W	Lyn.....	W. Cochins, Dorkings, Black Spanish, W. Minorcas, Brown, White, Buff and R. C. Leghorns, Indian Games, Pit Games, Hamburgs, Polands and Ducks.
Brethen, W. H. & Son.....	Norwood.....	White Wyandottes, White Leghorns.
Osborne, W. M.....	Brockville.	Andalusians, Minorcas, White, Black and R. C. Leghorns, S. S. Hamburgs, Houdans, Red Caps.
Frith, E. & Son	Winchester.....	W. P. Rock, Pit Game, Red Caps.
Gilbert & Jardine.....	Almonte.....	White Leghorns.
Bell, A. W., M.D.....	Toronto.....	Buff Cochins.
Parsons, J. H....	Osaca..	Buff P. Rocks, Buff Leghorns, Indian Games.
McPhie, N. D.....	Hamilton.....	Pigeons.
Palliser, C. W.....	Campbellford..... .	S. G. Dorkings, Black Minorcas, Brown Leghorns. S. S. Hamburgs.
Halpenny, J..	Ottawa.....	Brown Leghorns.

LIST OF MEMBERS.—*Continued.*

Name.	Post Office.	Varieties exhibited.
Devlin & Jacques	Ottawa	Barred P. Rocks.
Holland, Mrs. G. C.	Ottawa West	White Wyandottes.
Reid, W. H.	Kingston	D. Brahmas, Javas, Buff Wyandottes, Andalusians, W., Black and R. C. Leghorns, G. S. Hamburgs, Houdans, Sebright, Cochin, Japanese and Booted Bantams, Ducks nd Pigeons.
Fortier, V.	Ste. Thérese, Que.	Black Leghorns, B. Sumatras, Hamburgs, Polands, Houdans and Sebright, Black and White R. Comb and Japanese Bantams.
Blake, F. J.	Almonte	Golden and Silver Wyandottes.
Plante, A	Ottawa.	Buff Cochin Bantams and Pigeons.
Ottawa Pigeon Lofts	Ottawa	Pigeons.
Ottawa Poultry Yards	Ottawa	Cochins, Langshans, Andalusians, Minorcas, White and Brown Leghorns, Games, Indian Games, S. Pencilled Hamburgs and Game Black R. Comb and Cochin Bantams, Rouen Ducks.
Gisborne, F. H.	Ottawa	Indian Games, B. Minorcas.
Cumming, D.	Russell	L. Brahmas, Dorkings, Barred and White P. Rocks, Turkeys, Ducks and Geese.
Knight, W. R.	Bowmanville	L. Brahmas, W. and B. Cochins, Javas, Andalusians, Brown Leghorns, Hamburgs, Rouen and Aylesbury Ducks.
Daniels, C. J.	Toronto	L. Brahmas, Langshans, Javas, S. G. Dorkings, Barred, White and Buff P. Rocks, Golden, White and Buff Wyandottes, Minorcas, Black and R. C. Leghorns, Indian Games, Sumatras, Houdans, Red Caps, Anconas, Silkies and Buff Cochins, Japanese Bantams and Call Ducks.
Dewey, E. J.	Toronto	Langshans.
Strang, R.	Ottawa	Pigeons.
Delcorde, A.	Ottawa	Homing Pigeons.
Mutchmor, A. P.	Ottawa	See Ottawa Pigeon Lofts and Ottawa Poultry Yards.
McKinstrey, R.	Ottawa	
Murphy, Lewis	Brockville	Did not exhibit.
Graveley, R. J.	Cornwall	
Graham, W. R.	Guelph	
Smith, J. C.	Hintonburg	
McGurran, James	Ottawa	
McCready, F. G.	Brockville	

FINANCIAL STATEMENT.

The following is the statement of receipts and expenditures of the treasurer of the Eastern Ontario Poultry Association for the year ending January, 1899:

RECEIPTS.

Cash on hand from September, 1898	$404 71
Members' fees	103 00
Donations	48 00
Legislative grant	500 00
Entry fees	254 25
Interest	12 80
Gate money at exhibition	113 00
Sale of temporary coop materials	6 00
Total	$1,441 76

EXPENDITURE.

Cash paid for prizes	$506 24
Officers' salaries	50 00
Postage and stationery	14 39
Printing	8 15
Advertising	22 00
Judges' expenses	75 00
Insurance	7 50
Turkey coops, freight and duty	121 51
Cost of temporary coops and repairs	80 90
Superintendent	15 00
Caretaker	11 95
Doorkeeper	10 00
Clerical assistance	31 30
Feed	12 94
Freight on coops	25 50
Petty disbursements	16 00
Auditor	5 00
Moving coops	2 00
Rubber stamp	2 25
Total	$1,017 63
Balance	424 13

Examined and found correct this 26th day of January, 1900.

G. L. BLATCH, C A.,
Auditor.

FRANCIS H. GISBORNE,
Treasurer.

POULTRY PROGRESS IN CANADA.

E. H. Benjamin, Ottawa.

A retrospective glance at the year which has just expired will not fail to inspire the breeders and fanciers of poultry with confidence in the future; infuse into them a zeal for the continuance during another year of the work so successfully prosecuted during the past one, and to hopefully but determinedly persist in a work difficult in itself and *too frequently poorly and niggardly rewarded by a too exacting public.* To raise a number of chickens is of itself not a very difficult task, but to breed poultry to a well-defined standard, and to maintain that standard through successive generations of the same varieties, is a work of which any fancier may feel proud; and it is with no small degree of pride we look back on the exhibitions of the past year as proof that many of our breeders have now attained to that degree of excellence. Heretofore, as was but natural, we sought in other countries what we had not within ourselves: prize birds for breeding stock were freely imported from Europe and the United States. From England chiefly came the chief supply, and at prices, too, which often astonished the uninitiated, our breeders went to work with a determination to succeed, and they did so. We have now in the country a stock of poultry which, in the hands of intelligent men, need fear no competition from without, and the spirit of rivalry within will but stimulate to still greater exertion as well as exactness in breeding. The exhibitions of the past season are true indicators of our poultry progress, and viewed in the light of entries made and birds exhibited we cannot fail to see that rapid strides are being made. The spirit once confined to the few is now being infused into the many. Local exhibitions at one time with a single class for *large breeds* only, now classify those large breeds, and offer separate prizes in each class. Nor is it alone at exhibitions and among fanciers we find progress in poultry raising, but amongst the farmers generally. Year by year we find a steady tendency towards the improvement of the ordinary fowl by the infusion of a better class of stock-birds, and thus gradually but surely increasing their economical qualities. And this is exactly the kind of progress we are most desirous of seeing. Excellent as poultry exhibitions are, and nobody will deny that, we maintain as we always have done, that true poultry progress consists in introducing a better class of fowls into any farm yard in Canada. Inspire the farmer with confidence in the undertaking, show him that the infusion of new blood will increase his old stock in size, in flesh-forming and laying qualities, and that at the end of the season he will be pecuniary benefitted by the additional outlay in procuring new stock, and the true foundation of poultry progress is laid. And this is just what has been going on during the past season, and we trust will continue for many years to come; but still there is much room for improvement.

SKILL IN CROSSING FOWLS.

E. H. Benjamin, Ottawa.

This short paper entitled "Skill in Crossing Fowls" is one I have for a long time studied. My ideas and suggestions may not coincide with those of some breeders, but I think in the main points they may prove useful to the farmer.

There is as much skill in crossing for the production of a superior large or market fowl as in bringing out the beautiful plumage of the pure breeds, but while the crossing of some of the breeds will give excellent results, it unfortunately happens that the crossing of breeds, as it occurs on most farms, is more a matter of accidents than of method. To turn all the different kinds together and "trust to luck" is no proper way to effect a cross. Some breeds "nick" with others better than with breeds widely different, and to learn how to make a desirable cross it is best to experiment, but before doing so one should know what to cross for. In other words there should be some special objects in view, and it should be sought until it is attained.

Among the several breeds are some that excel in those points most desirable for the table. At the same time they combine superior laying qualities. Among them may be mentioned Langshans, Black Wyandottes, Javas and Houdans, all black fowl, or nearly so,

and as it is best to breed birds nearly of the same color, I select the four varietes named to show how crossing may be done for both table quality and egg production. The Langshan is a bird that is well filled on the breast, is an active forager, a good layer and hardy, being an Asiatic breed. The Houdan is a non-sitter, and one of the most compact breeds we have, and a general favorite in France. A cross of the Houdan male and Langshan hen gives a hardy product, one that lays well at all seasons and is excellent for the table. The pullets of the cross should be reserved, and the next season the Black Java male may be used with them. It will be a complete change of blood, and the crest derived from the Houdan will be reduced. If the half-bred Java pullets be retained they may be mated with a black Wyandott male, which gives a very compact body also. With four different crosses, all that is necessary is to now go back to the Langshan male for the next cross, and continue with the Houdan, Java, and Wyandotte. Always use a pure-bred male, never a cross-bred male. In this manner the flock will be improved each year.

Another excellent mode is to mate a Brown Leghorn male with Partridge Cochin hens, and retain the pullets, which should be mated with a large Black Red Pit game male the pullets of the second cross to be mated with a colored Dorking male, to be followed next with a Partridge Cochin male and then the Leghorn. This gives systematic crossing and makes the flock uniform in every respect. To cross by turning all breeds out together is to destroy uniformity, but to breed for what you want means a close adherence to the use of pure bred birds.

PURE-BRED AND MONGREL POULTRY.

C. J. Devlin, Ottawa.

Among a certain class of farmers the idea seems prevalent that chickens are chickens no matter whether they are pure-bred or scrubs. They are unable to see or do not want to see any real merit in well bred poultry. And they ridicule the idea that there is any more practical value in a well-bred chicken than in their scrubs. Is there nothing in breeding? Can we expect to reap correspondingly good results from the haphazard breeding of the common fowls that we would obtain from the scientifically mated thoroughbred? It is truly hard to understand why this class of our people still continue to breed scrubs with all the evidence of poultrydom in favor of pure breeds.

Where can one find a flock of mongrels which will compare with the lively Leghorn as egg machines? Did our forefathers ever own a flock of common fowls that would yield them the quality or quantity of meat or eggs that our Wyandottes and Plymouth Rocks in their purity do for us to-day?

With our best fanciers the Leghorns have been bred for years with one object in view, that of egg production, and with Plymouth Rocks and Wyandottes their aim has been to breed fowls which will excel as general purpose breeds both for egg and meat.

All the large poultry plants financially successful to-day are stocked with pure-bred poultry, and any farmers who are still holding on to the out of date mongrels in hopes of making money will be apt to be found among the kickers against the poultry business.

Pure-bred stock that is bred for practical results as well as appearance, is not only capable of producing more eggs and meat than common fowls, but when bred will produce their kind and give their characteristics to their young each succeeding generation.

The pure-bred has come to stay as a practical as well as a beautiful fowl. Any one visiting our winter shows must see a great improvement in the stock shown each year. Where would our grand and useful fowls of to-day be but for our fanciers? At our own show this winter held at Ottawa, there were lots of Rocks and Wyandottes one and two pounds over standard weight, and all showing the perfect shape of the breed that they represent. Turkeys weighing from thirty-nine pounds to forty-one pounds! Where are your common turkeys compared with these? It is time our farmers were up and doing. The chance is at their doors. The fanciers are trying to help them, and are willing and anxious to do so if they will only let them.

PRACTICAL HINTS BY A PRACTICAL MAN.

W. M. Osborne, Brockville.

In raising poultry the only method to get good success is to be extremely clean and tidy about your hen houses and yards. Filth is the germ of all poultry ailments. If they are kept clean and properly fed there will be no fear of any sickness among your flock. I usually feed my fowls only one meal a day in winter and the same in summer; usually at noon in the winter and in the evening in summer. I generally give my flock of about forty hens one gallon of grain a day in the winter and I find this is plenty and sometimes too much. You have to judge by experience if you are giving enough or too much. A fat hen will not lay enough eggs to pay for her feed. It is a great mistake to overfeed, especially in the winter time, as they will never do well. I give them all the turnips they will eat. I chop them in two pieces and throw them into the runs, and they do the rest. The last two winters I have given them all the green bone they will eat and the only grain I have used is pure wheat, which is the cheapest in the long run as there is nothing wasted, and I am never without fresh eggs. The grain is thrown amongst the litter on the hen house floor, and the birds are kept busy scratching for it. Whenever I make my appearance they are on the alert for more feed. Even at night time when I go to the hen house with a lamp they jump down off their perches ready every time.

A hen house ought to be keep thoroughly dry, and of medium heat in the winter. To have the best success I burn about 12½ cents worth of coal a week during the very cold weather so as to keep dampness away and to keep frost out of the house. I would advise anyone building a hen house to fill in the walls with pine sawdust, as it makes the warmest house in winter and the coolest in summer. The house should be cleaned twice a week—that is the dropping boards—and then put a little coal oil and crude carbolic acid on the perches if you have no brackets under your perches. I use perches, but on brackets that have cups, and I fill the cups once a week, and am not bothered with vermin at any time. I can give you a very simple but sure receipt for destroying vermin:—Get a box that will hold say six to twelve birds, and if you like place a piece of white paper over the bottom and have no top. Saturate the sides and bottom of the box with coal oil and about four ounces of crude carbolic acid mixed in half a gallon of coal oil. This quantity will last you for six months. I usually put it on with an old paint brush. Now take an old piece of bag or sacking and tack it over top of box leaving a hole to put the birds in. Put your fowls in, close the sack down and leave them over night. You will be astonished at the dead vermin lying on the bottom of the box in the morning. I will guarantee that there will not be any live ones left on the birds, as it is sure death, and it will not injure the fowls. This receipt is good, too, for a brooding hen and her chickens. It is the best remedy I ever knew, and puts all patent vermin destroyers in the shade.

CHOOSING A VARIETY.

Francis H. Gisborne, Ottawa.

There are few things more puzzling to those commencing poultry-keeping or those desirous of improving the class of birds they keep than the question of which is the best variety. To consult the breeders themselves is only to be told that the particular variety they breed is the best. The poultry papers are afraid to advocate any particular breed for fear they may lose the patronage of those who breed other varieties. The poultry Superintendents at Government farms meet with a similar difficulty; they cannot in consequence of their official position undertake to boom any particular breed. As I am myself a disinterested party, having no private axe to grind and as I have tried a good many varieties, and have moreover made it a constant subject of study and enquiry for a number of years past, I may perhaps be allowed to state my views.

The first thing to consider is what do you want your fowls principally for—eggs, or meat, or a combination of both? If you want the third, you will not have the best for the first, though you may have very good meat. Poultrymen have for years been develop

ing poultry for certain practical ends, and when a bird has been developed with the end and object of making it before everything a layer it will not make the best dressed poultry. The best layers are the most active of all poultry, always scratching and busy. The best meat producers are less active, quietly roosting or sitting in quiet corners turning their food into flesh. There is no doubt that the best egg producers are the mediterranean class and the Hamburgs, but the eggs of the latter are too small, and the field is thus left clear for the former. For summer layers the Black Minorcas are unequalled, but unless your hen house is very warm they do not lay except fitfully in the winter. For large eggs and continuous laying, in my opinion the larger strains of White Leghorns and the Andalusians are unexcelled. The White Leghorn is the much commoner and cheaper fowl, and is much easier to breed good. The chickens are easily raised, they mature very rapidly, and the eggs are usually fertile even in the early spring. Care should, however, be taken not to allow laying birds out even on comparatively warm days in winter, as there is no fowl that is so quickly affected by a change of temperature. One of the most successful producers of winter eggs, Mr. A. A. Blyth, of Ottawa, told me that he never allowed his Leghorns out from the time, as he put it, that the ground was black in the autumn until it was black again in the spring. The Leghorn is of course a non-incubating variety, so that to raise chickens the eggs must be hatched either in an incubator or else under other hens. Black and Brown Leghorns are also good layers but the eggs are in general much smaller than those laid by the White.

It is to be regretted that the Andalusians have not been used to the same extent as White Leghorns for they lay a very fine, large egg.

When you come to select a general purpose fowl—that is a bird that is a fairly good layer, that will hatch its own chickens and that will give the poulterer a nice carcase—the selection is much more difficult. Of the Asiatics the Langshan is undoubtedly far away the best. Our American cousins contend for the Light Brahma, but the Light Brahma is essentially an exceedingly coarse fowl with large bones, immense legs, poor breast and an undue amount of offal. To my mind, however, the feathered legs are an insuperable objection to the whole Asiatic class. It is hard to keep them clean, the feathered feet break the eggs when the hens are sitting, and are also destructive of the chickens, while it is almost impossible to so pluck the legs as to make the dressed fowl look attractive. To exclude the Asiatic class leaves us the American class, consisting for our present purpose of Plymouth Rocks and Wyandottes, and the English class consisting of coloured and Silver Grey Dorkings. Those who have kept Silver Grey Dorkings recommend them highly as good layers, and they are the best of table fowl. The chickens are, however, distinctly difficult to raise, and are for that reason unsuitable for us in Eastern Ontario. In Western and Southern Ontario the same objection may not hold. This reduces our list to Plymouth Rocks and Wyandottes, and I am satisfied that a person selecting either varieties of either of these two breeds would find that they had selected an admirable all round useful fowl, one that will lay well especially in winter and that when eggs are at their lowest price will raise their clutches of chickens. The chickens are hardy and mature rapidly, and when dressed make a good table fowl that will sell well in any market, foreign and domestic

I have preference myself for white fowl, as I think they dress much better than coloured ones, especially when they have not yellow legs and beaks (the maintenance of which yellow colour is a constant trouble to the fancier); but there is no doubt that owing to the larger number of birds in the country it is easier and cheaper for farmers to get barred Plymouth Rocks than the other colours, or than the Wyandottes. The Wyandotte is a smaller boned fowl, and matures more rapidly than the Plymouth Rock, but it is about a pound lighter. Upon the whole, therefore, I would advise the Barred Plymouth Rock for a general purpose fowl.

The best fowl for meat that we can raise in this country, is probably the Dorking, though first crosses with Cornish Indian Games are an improvement. However, as I keep Indian Games myself I will say nothing as to their merits, especially as (in my opinion) as the markets at present stand in this country either egg breeds or general purpose breeds are what should be kept. I would like to see the Canadian farmers make a speciality of one breed, say Barred Plymouth Rocks, breed them for points of practical value, good breasts long and wide with plumb carcases and nice white skin, leaving the yellow legs and the yellow skin that usually accompanies it to the fanciers. England wants nice,

white, plump poultry, and the English have been famous for the attention they have paid to the festive board for a great many hundred years. The French, too, the greatest cooks in the world also insist upon white skin. I would, therefore, urge that we in Canada should try and imitate the old country in the matter of poultry, and what birds we cannot consume ourselves we will then be able to sell to England at a good profit without the expense and loss of sorting poultry fit only for one market from poultry fit only for the other market.

PRIZE LIST.

Brahma—Light.

Cock.—1st, Nantel ; 2nd, Knight ; 3rd, Stewart.
Hen.—1st, Cole ; 2nd, Daniels ; 3rd, Nantel.
Cockerel.—1st, Nantel ; 2nd Cole ; 3rd, Daniels.
Pullet.—1st, Nantel ; 2nd and 3rd, Cole.

Brahma—Dark.

Hen.—1st and 2nd, Nantel ; 3rd, Reid.
Cockerel.—1st, Nantel.
Pullet.—1st, Nantel.

Cochin—Buff.

Cock.—1st, Ottawa Poultry Yards ; 2nd, Bell ; 3rd, Nantel.
Hen.—1st and 2nd, Bell ; 3rd, Nantel.
Cockerel.—1st, Nantel ; 2nd, Bell.
Pullet.—1st, Ottawa Poultry Yards ; 2nd, Nantel ; 3rd, Bell.

Cochin—Partridge.

Cock.—1st, Nantel ; 2nd, Ottawa Poultry Yards.
Hen.—1st, Ottawa Poultry Yards ; 2nd, Nantel.
Cockerel.—1st, Nantel.
Pullet.—1st, Ottawa Poultry Yards ; 2nd, Nantel.

Cochin—Black.

Cockerel.—1st and 2nd, Nantel ; 3rd, Ottawa Poultry Yards.
Pullet.—1st, Ottawa Poultry Yards ; 2nd and 3rd, Nantel.

Cochin—White.

Cock.—1st, Nantel ; 2nd, Ottawa Poultry Yards.
Hen.—1st and 3rd, Ottawa Poultry Yards ; 2nd, Nantel.
Cockerel.—1st and 2nd, Nantel ; 3rd, Ottawa Poultry Yards.
Pullet.—1st and 3rd, Nantel ; 2nd, Ottawa Poultry Yards.

Langshan.

Cock.—1st, Dewey ; 2nd, Ottawa Poultry Yards ; 3rd, Garland.
Hen.—1st, Dewey ; 2nd and 3rd, Ottawa Poultry Yards.
Cockerel.—1st, Baillie ; 2nd, Dewey ; 3rd, Ottawa Poultry Yards.
Pullet.—1st, Dewey ; 2nd, Baillie ; 3rd, Daniels.

Java.

Cock.—1st, Eves ; 2nd, Reid.
Hen.—1st, Daniels ; 2nd, Eves ; 3rd, Reid.
Cockerel.—1st Daniels.
Pullet.—1st, Knight ; 2nd, Daniels.

Dorking—Silver Grey.

Cock.—1st, Daniels ; 2nd, Neilson ; 3rd, Stewart.
Hen.—1st, Neilson ; 2nd, Daniels.
Cockerel.—1st, Palliser ; 2nd, Daniels ; 3rd, Stewart.
Pullet.—1st, Cumming ; 2nd, Stewart ; 3rd, Palliser.

Dorking—A.O.V.

Cock.—1st, Neilson.
Hen.—1st, Neilson ; 2nd, Stewart.
Cockerel.—1st and 2nd, Stewart.
Pullet.—1st and 2nd, Stewart.

Plymouth Rock—Barred.

Cock.—1st, Devlin & Jacques.
Hen.—1st and 3rd, Devlin & Jacques ; 2nd, Cumming.
Cockerel.—1st, Devlin & Jacques ; 2nd, Cumming ; 3rd, Daniels.
Pullet.—1st, 2nd and 3rd, Devlin & Jacques.

PLYMOUTH ROCK—WHITE.

Cock.—1st, Gray.
Hen.—1st, Daniels ; 2nd and 3rd, Gray.
Cockerel.—1st, Gray ; 2nd, Daniels ; 3rd, Frith & Son.
Pullet.—1st, Gray ; 2nd, Daniels ; 3rd, Frith & Son.

PLYMOUTH ROCKS—BUFF.

Cock.—1st, Parsons ; 2nd, Daniels.
Hen.—1st, Parsons ; 2nd, Daniels.
Cockerel.—1st and 2nd, Parsons ; 3rd, Daniels.
Pullet.—1st and 2nd, Parsons ; 3rd, Daniels.

WYANDOTTE—GOLDEN.

Cock.—1st, Oldrieve ; 2nd, Magill ; 3rd, Eves.
Hen—1st and 3rd, Magill ; 2nd, Eves.
Cockerel—1st and 2nd, Magill ; 3rd, Oldrieve.
Pullet—1st and 2nd, Blake ; 3rd, Magill.

WYANDOTTE—SILVER.

Cock—1st, Blake ; 2nd, Mrs. Harmer.
Hen—1st, Blake.
Cockerel—1st, Mrs. Harmer.
Pullet—1st, Mrs. Harmer ; 2nd and 3rd, Blake.

WYANDOTTE—BUFF.

Cock—1st, Daniels ; 2nd, Reid.
Hen—1st, Daniels ; 2nd, Reid.
Cockerel—1st, Daniels ; 2nd, Baillie.
Pullet—1st, Daniels ; 2nd, Baillie.

WYANDOTTE—WHITE.

Cock—1st, Daniels ; 2nd and 3rd, Mrs. Holland.
Hen—1st and 3rd, Mrs. Holland ; 2nd, Daniels.
Cockerel—1st, Brethen ; 2nd, Mrs. Holland ; 3rd, Daniels.
Pullet—1st, Daniels ; 2nd and 3rd, Mrs. Holland.

SPANISH—BLACK.

Cock—1st, Neilson.
Hen—1st, Neilson.
Cockerel—1st, Neilson.
Pullet—1st, Neilson.

ANDALUSIANS.

Cock—1st Knight ; 2nd, Osborne ; 3rd, Ottawa P. Yards.
Hen—1st, Osborne ; 2nd, Knight ; 3rd, Reid.
Cockerel—1st, Osborne ; 2nd, Knight.
Pullet—1st, Knight.

MINORCA—BLACK.

Cock—1st and 3rd, Ottawa P. Yards ; 2nd, Fraser.
Hen—1st, Ottawa P. Yards ; 2nd, Stewart ; 3rd, Osborne.
Cockerel—1st, Stewart ; 2nd, Fraser.
Pullet—1st, Frith ; 2nd, Garland ; 3rd, Daniels.

MINORCA—WHITE.

Cock—1st, Neilson ; 2nd, Osborne ; 3rd, Ottawa P. Yards.
Hen—1st, Daniels ; 2nd, Ottawa P. Yards ; 3rd, Neilson.
Cockerel—1st, Osborne.
Pullet—1st, Osborne ; 2nd, Neilson.

LEGHORNS—S. C. WHITE.

Cock—1st, Ottawa P. Yards ; 2nd, Gilbert & Jardine ; 3rd, Graham.
Hen—1st, Gilbert & Jardine ; 2nd, Stewart ; 3rd, Graham.
Cockerel—1st and 3rd, Graham ; 2nd, Ottawa P. Yards.
Pullet—1st and 3rd, Gilbert & Jardine.

LEGHORNS—S. C. BROWN.

Cock—1st, Mills.
Hen—1st, Mills ; 2nd and 3rd, Ottawa P. Yards.
Cockerel—1st, Halfpenny ; 2nd, Knight ; 3rd, Mills.
Pullet—1st and 2nd, Mills ; 3rd, Palliser.

LEGHORNS—S. C. BLACK.

Cock—2nd, Osborne and Daniels, equal ; 3rd, Fortier.
Hen—1st and 2nd, Osborne ; 3rd, Foreier.
Cockerel—1st, Daniels ; 2nd, Osborne ; 3rd, Fortier.
Pullet—1st, Daniels ; 2nd, Fortier ; 3rd, Osborne.

LEGHORNS—BUFF.

Cock—1st, Graham ; 2nd and 3rd, Parsons.
Hen—1st, Graham ; 2nd and 3rd, Parsons.
Cockerel—1st and 3rd, Parsons ; 2nd, Neilson.
Pullet—1st, Neilson ; 2nd and 3rd, Parsons.

LEGHORNS—R. C. BROWN.

Cock -1st, Oldrieve ; 2nd, Stewart ; 3rd, Eves.
Hen—1st, Oldrieve ; 2nd, Eves ; 3rd, Stewart.
Cockerel—1st, Oldrieve ; 2nd and 3rd, Stewart.
Pullet—1st, Stewart ; 2nd and 3rd, Oldrieve.

LEGHORNS—R. C. A. O. V.

Cock—1st, Stewart ; 2nd, Neilson ; 3rd, Daniels.
Hen—1st, Stewart ; 2nd, Daniels ; 3rd, Neilson.
Cockerel -1st, Stewart ; 2nd, Osborne ; 3rd, Neilson.
Pullet—1st, Stewart ; 2nd, Daniels ; 3rd, Neilson.

GAME—BLACK RED.

Cock—1st, Oldrieve.
Hen—2nd, Ottawa P. Yards ; 3rd, Oldrieve.

GAME—BROWN RED.

Cock—1st, Oldrieve.
Hen—1st and 3rd, Ottawa P. Yards ; 2nd, Oldrieve.
Cockerel -1st, Oldrieve.
Pullet—1st and 2nd, Oldrieve.

GAME—DUCKWING.

Cock—1st, Oldrieve ; 2nd, Ottawa P. Yards.
Hen—1st, Oldrieve ; 2nd, Ottawa P. Yards.
Pullet—1st, Oldrieve.

GAME PYLE.

Cock—1st, Ottawa P. Yards.
Hen—1st and 3rd, Oldrieve ; 3nd, Ottawa P. Yards.

GAME—CORNISH INDIAN.

Cock—1st and 2nd, Parsons ; 3rd, Neilson.
Hen—1st, Neilson ; 2nd and 3rd, Parsons.
Cockerel—1st, Gisborne ; 2nd and 3rd, Parsons.
Pullet—1st and 2nd, Parsons ; 3rd, Gisborne.

GAME—A. O. S. V. OR WHITE INDIAN.

Cock—1st, Fortier ; 2nd, Daniels ; 3rd, Parsons.
Hen—1st, Daniels ; 2nd, Parsons ; 3rd, Fortier.
Cockerel—1st and 3rd, Fortier ; 2nd, Daniels.
Pullet—1st, Daniels ; 2nd and 3rd, Fortier.

GAME—OLD ENGLISH OR PIT.

Cock—1st, 2nd and 3rd—Benjamin.
Hen—1st and 3rd, Benjamin ; 2nd, Neilson.
Cockerel—1st, Benjamin ; 2nd and 3rd, Neilson.
Pullet—1st, Neilson ; 2nd, Benjamin.

HAMBURG—BLACK.

Cock—1st, Fortier.
Hen—1st and 2nd, Fortier.
Cockerel—1st, Fortier ; 2nd, Murphy.
Pullet—1st, Fortier ; 2nd and 3rd, Murphy.

HAMBURG—PENCILLED.

Cock.—1st, Neilson.
Hen.—1st and 3rd, Neilson ; 2nd, Knight.
Cockerel.—1st, Neilson ; 2nd, Stewart.
Pullet.—1st Ottawa Poultry Yard ; 2nd, Knight ; 3rd, Neilson.

HAMBURG—GOLDEN SPANGLED

Cock.—1st, Neilson.
Hen.—1st, Reid ; 2nd, Neilson.
Cockerel.—1st, Neilson.
Pullet.—1st and 2nd, Neilson.

HAMBURG—SILVER SPANGLED.

Cock—2nd, Fortier.
Hen.—1st, Stewart ; 2nd, Osborne ; 3rd, Palliser.
Cockerel.—1st, Stewart ; 2nd, Fortier.
Pullet.—1st and 2nd, Stewart ; 3rd, Fortier.

POLANDS—W. C. BLACK.

Cock.—1st and 2nd, Fortier ; 3rd, Stewart.
Hen.—1st and 2nd, Fortier ; 3rd, Stewart.
Cockerel.—1st, Fortier.
Pullet.—1st, Fortier.

POLAND—GOLDEN.

Cock.—1st and 2nd, Fortier.
Hen.—1st and 2nd, Fortier.
Cockerel.—1st, Fortier ; 2nd, Stewart.
Pullet.—1st, Stewart ; 2nd, Fortier.

POLAND—SILVER.

Cock.—Fortier.
Hen.—1st, Fortier ; 2nd, Stewart.
Cockerel.—1st, Stewart ; 2nd, Fortier.
Pullet.—1st and 2nd. Fortier ; 3rd, Stewart.

POLAND—A.O.S.V.

Cock.—1st and 2nd, Fortier.
Hen.—1st and 2nd, Fortier.
Cockerel.—1st and 2nd, Fortier.
Pullet.—1st and 2nd, Fortier.

HOUDAN.

Cock.—4st, Fortier ; 2nd, Reid ; 3rd, Osborne.
Hen.—1st, Fortier ; 2nd, Osborne ; 3rd, Stewart.
Cockerel.—1st, Osborne ; 2nd, Daniels ; 3rd, Reid.
Pullet.—1st, Osborne ; 2nd, Reid ; 3rd, Fortier.

RED CAP.

Cock.—1st, Stewart ; 2nd and 3rd, Daniels.
Hen.—1st and 3rd, Daniels ; 2nd, Stewart.
Cockerel.—1st, Osborne ; 2nd, Daniels ; 3rd, Stewart.
Pullet.—1st and 2nd, Daniels.

A.O.S.V. FOWL.

Cock.—1st and 2nd, Daniels.
Hen.—1st and 2nd, Daniels.
Cockerel.—1st and 2nd, Daniels.
Pullet.—1st and 2nd, Daniels.

TURKEYS—BRONZE.

Cock.—1st, Thompson ; 2nd, Stewart ; 3rd, Cumming.
Hen.—1st, Cumming ; 2nd, Thompson.
Cockerel.—1st and 2nd, Thompson ; 3rd Cumming.
Pullet.—1st, Thompson ; 2nd, Cumming ; 3rd, Stewart.

TURKEYS—A.O.V.

Cock.—1st and 3rd, Cumming ; 2nd, Thompson.
Hen.—1st, Thompson ; 2nd Cumming.
Cockerel.—1st and 2nd, Thompson ; 3rd, Cumming.
Pullet.—1st, Thompson : 2nd, Cumming.

BANTAMS—BLACK RED GAME.

Cock.—1st, Oldrieve ; 2nd, Ottawa P. Yards.
Hen.—1st, Oldrieve ; 2nd and 3rd, Ottawa P. Yards.
Pullet.—1st and 2nd, Oldrieve.

BANTAM—BROWN RED GAME.

Cock.—1st, Oldrieve ; 2nd, Ottawa P. Yards.
Hen.—1st and 3rd, Ottawa P. Yard ; 2nd, Oldrieve.
Cockerel.—1st, Oldrieve.
Pullet.—1st and 2nd, Oldrieve.

BANTAM—DUCKWING GAME.

Cock.—1st and 3rd, Ottawa P. Yards ; 2nd, Oldrieve.
Hen.—1st, Oldrieve ; 2nd, Ottawa P. Yards.
Pullet.—1st, Ottawa P. Yards.

BANTAM—PYLE GAME.

Cock.—1st and 2nd, Ottawa P. Yards.
Hen.—1st and 2nd, Ottawa P. Yards.
Cockerel.—1st, Oldrieve.
Pullet.—1st, Ottawa P. Yards.

BANTAM—GOLDEN SEBRIGHT.

Cock.—1st, Oldrieve ; 2nd, Reid ; 3rd, Garland.
Hen.—1st and 2nd, Reid, 3rd, Garland.
Cockerel.—1st and 2nd, Reid, 3rd, Stewart.
Pullet.—1st and 2nd, Reid ; 3rd, Stewart.

BANTAM—SILVER SEBBIGHT.

Cock.—1st, Fortier ; 2nd, Reid ; 3rd, Oldrieve.
Hen.—1st, Fortier : 2nd, Oldrieve ; 3rd, Reid.
Cockerel.—1st, Fortier ; 2nd, Stewart.
Pullet.—1st, Fortier ; 2nd, Stewart ; 3rd, Reid.

BANTAM—BLACK ROSE COMB.

Cock.—1st, Murphy ; 2nd, Ottawa P. Yards ; 3rd, Oldrieve.
Hen.—1st, Ottawa P. Yards ; 2nd, Oldrieve ; 3rd, Murphy.
Cockerel.—1st, Murphy ; 2nd, Oldrieve.
Pullet.—1st and 3rd, Murphy ; 2nd, Oldrieve.

BANTAM—COCHIN BUFF.

Cock.—1st, Plante ; 2nd, Baillie ; 3rd, Daniels,
Hen.—1st Daniels ; 2nd and 3rd, Plante.
Cockerel.—1st, Plante ; 2nd, Bailie : 3rd, Daniels.
Pullet.—1st and 2nd, Plante ; 3rd Baillie.

BANTAM—COCHIN BLACK OR WHITE.

Cock.—1st, Reid.
Hen.—1st, Reid ; 2nd and 3rd, Ottawa P. Yards.
Cockerel.—1st, Nantel.
Pullet.—1st, Reid ; 2nd, Nantel.

BANTAM—JAPANESE.

Cock.—1st, Reid ; 2nd, Daniels.
Hen.—1st and 2nd, Reid ; 3rd, Daniels.
Cockerel.—1st, Daniels ; 2nd, Reid.
Pullet.—1st, Daniels ; 2nd, Reid ; 3rd, Fortier.

BANTAM A.O.S.V.

Cock.—1st, V. Fortier ; 2nd, Ottawa P. Yards ; 3rd, Reid.
Hen.—1st, V. F ier ; 2nd, Reid.

TOULOUSE GEESE.

Gander.—1st and 2nd, Thompson ; 3rd, Cumming.
Goose.—1st and 2nd, Thompson ; 3rd, Cumming.
Gander of 1899.—1st, Thompson.
Gooee of 1899.—1st, Thompson.

EMBDEN GEESE.

Gander.—1st and 2nd, Thompson.
Goose.—1st and 2nd, Thompson.
Gander of 1899.—1st, Thompson, 2nd, Cumming.
Goose of 1899.—1st, Thompson ; 2nd, Cumming.

CHINA GEESE

Gander.—1st, Cumming ; 2nd and 3rd, Thompson.
Goose.—1st, Cumming ; 2nd, Thompson.
Gander of 1899.—1st, Cumming , 2nd, Thompson.
Goose of 1899.—1st, Cumming ; 2nd and 3rd, Thompson.

GEESE A.O.V.

Gander.—1st and 2nd, Thompson.
Goose.—1st, Thompson.
Gander of 1899.—1st, Thompson.
Goose of 1899.—1st, Thompson.

ROUEN DUCKS.

Drake.—1st, Knight ; 2nd, Reid ; 3rd, Ottawa P. Yards.
Duck.—1st, Knight ; 2nd, Cumming ; 3rd, Ottawa P. Yards.
Drake of 1899.—1st, Stewart ; 22d, Thompson ; 3rd, Neilson.
Duck of 1899.—1st, Stewart ; 2nd, Neilson ; 3rd, Thompson.

PEKIN DUCKS.

Drake.—1st, Cumming ; 22d, Neilson.
Duck.—1st, Thompson ; 2nd. Cumming ; 3rd, Neilson.
Drake of 1899.—1st, Neilson ; 2nd, Thompson.
Duck of 1899.—1st, Neilson ; 2nd, Thompson.

AYLESBURY DUCKS.

Drake.—1st, Stewart ; 2nd, Knight ; 3rd, Thompson.
Duck.—1st, Stewart ; 2nd, Knight ; 3rd, Thompson.
Drake of 1899.—1st, Stewart ; 2nd, Knight ; 3rd, Reid.
Duck of 1899.—1st, Knight ; 2nd, Thompson.

Cayuga Ducks.

Drake.—1st, Neilson ; 2nd, Cumming ; 3, Thompson.
Duck.—1st, Cumming ; 2nd, Thompson.
Drake of 1899.—1st and 2nd, Thompson ; 3rd, Reid.
Duck of 1899.—1st and 3rd, Thompson ; 2nd, Neilson.

A. O. V. Ducks.

Drake.—1st, Thompson ; 2nd, Neilson ; 3rd, Daniels.
Duck.—1st and 2nd. Thompson ; 3rd, Neilson.
Drake of 1899.—1st and 2nd, Thompson.
Duck of 1899.—1st and 2nd, Thompson.

Pigeons.

J. H. Magill.—Pouters, white—1st, cock ; 1st, hen. Pouters, black or blue—1st, hen ; 1st, cock. Pouters a.o.c.—1st, cock ; 1st, hen.

O'Toole & Noel.—Pouters, white—2nd, hen. Jacobins, red or yellow—2nd, cock. Fantails, white P. H.—1st, cock ; 1st, hen. Fantails, black or blue—1st, hen. Turbits, red or yellow—2nd, hen. Turbits, a.o.c. 2nd, cock ; 3rd, hen. Owls, African—2nd, cock ; 1st, hen. Swallows, blue or black—1st, cock ; 2nd, hen. Archangels—1st, cock ; 2nd, hen. Nuns, black—1st, cock. a.o.v. Pigeon—1st, cock.

W. H. Reid.—Pouters, black or blue—2nd, cock ; 2nd, hen. Pouters, a.o.c.—2nd hen. Jacobins, red or yellow—3rd, cock ; 3rd, hen. Jacobins, a.o.c.—2nd, cock ; 2nd, hen. Fantails, white P. H.—3rd, cock ; 2nd, hen. Fantails, black or blue—2nd, cock ; 2nd, hen. Fantails, a.o.c.—1st, hen. Trumpeters, Russian, black—2nd, cock. Tumblers, L. F.—3rd, cock ; 2nd, hen. Archangels—3rd, cock ; 1st, hen. Magpies, red—2nd, cock ; 2nd, hen. Nuns, black—2nd, hen.

N. D. McPhie.—Jacobins, red or yellow—1st, cock ; 1st, hen. Jacobins, a.o.c.—1st, cock. Antwerps, L. F.—1st, hen. Swallows, red or yellow—2nd, cock. Homers, a.o.c.—1st and 2nd, cock ; 1st and 2nd, hen.

A. Plante.—Fantails, white P. H.—2nd, cock. Turbits, a.o.c.—1st, hen. Swallows, a.o.c.—1st and 2nd, cock : 1st and 3rd, hen. a.o.v. Pigeon—1st, hen.

Arthur Delconde.—Homers, blue or silver—1st, cock : 1st, hen.

R. Strang.—Turbits, a.o.c.—1st, cock. Swallows, red or yellow—1st, hen. Homers, a.o.c.—3rd, cock ; 3rd, hen.

Ottawa Pigeon Lofts.—Pouters, black or blue—3rd, cock. Barbs, black or blue—1st, cock ; 1st, hen ; Jacobins, red or yellow—2nd, hen. Fantails, black or blue—1st, cock. Trumpeers, Russian, black—1st, cock ; 1st, hen. Trumpeters, a.o.c.—1st, hen. Tumblers, S.F.—1st, cock ; 1st, hen. Tumblers, L.F.—1 and 2nd, cock : 2nd and 3rd, hen. Antwerps, L.F.—1st, cock. Turbits, red or yellow—1st, cock : 1st, hen. Turbits, a.o.c.—2nd, hen. Owls, English chequered—1st and 2nd, cock ; 1, hen. Owls, African—1st, cock ; 2nd, hen. Swallows, red or yellow—1st, cock ; 2nd and 3rd, hen. Swallows, blue or black—2nd, cock ; 1st, hen. Swallows, a.o.c.—3rd, cock ; 2nd, hen. Archangels—2, cock ; 3rd, hen. Magpies, black—1st and 2nd, cock ; 1st and 2nd, hen. Magpies, red—1st, cock : 1st, hen. Magpies, a.o.c;—1st and 2nd, cock ; 1st and 2nd, hen. Nuns, black—2nd, cock ; 1st, hen. Dragoons—1st and 2nd, cock ; 1st and 2nd, hen. a.o.v. pigeon—2nn, cock.

Farmers' Pen Heavy Breed Fowl—1st, A. Thompson ; 2nd, D. Cumming.
Farmers' Pen Light Breed Fowl.—1st, A. A. Fraser ; 2nd, Brethen & Son ; 3rd, Stewart & Son.
White Eggs.—1st, E. R. Frith : 2nd, Mrs. Holland ; 3rd, Halpenny ; 4th, D. Cumming.
Colored Eggs.—1st, Stewart & Son ; 2nd, C. J. Daniels ; 3rd, D. Cumming ; 4th, Mrs. Holland.
Guinea Fowl.—1st, C. J. Daniels.

BINDING SECT. AUG 2 3 1967